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# THE MADRAS CLINICAL JOURNAL

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Vol. XXV] SEPTEMBER 1958 [No. 3

# COULD TRAUMA CAUSE TUMOUR?

*by*

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&

A. KRISHNA, B.SC., M.B., B.S.,

THE title of this paper has been purposely posed as a query because the question does not admit of a definitive answer, either positive or negative. But the problem is well worth an enquiry both clinically and statistically. About two years back one of our medical colleagues had a partial cut at the base of a hairy mole on the face while shaving. The wound healed by first intention. Subsequently there was no noticeable alteration in the size of the mole, but there has been a definite increase in the rate of growth of hair over it. This instance specially led us to probe into the problem. The paper presents an approach to this important issue on the basis of the knowledge available at present.

**Scope of the enquiry :-**

It is necessary at the outset to define the limit of the scope of this enquiry. By trauma we mean only simple acute mechanical injury to tissue and its sequelae in tissue repair. We do not include in this enquiry considerations of acute injury caused by bacterial, chemical and other physical agents including radiation, nor chronic irritation and chronic inflammation.

**Embryological analogy :—**

Fertilization of the ovum by the spermatozoon can justifiably be considered as a trauma on the mature ovum. It is fertilization that initiates the processes of segmentation and differentiation leading to the development and growth of the embryo. It has been experimentally proved while inducing artificial parthenogenesis that the ova of fishes and amphibia could be made to develop by simple pricking with a needle. We can therefore consider that the phenomenon of fertilization serves two purposes : (1) Permitting the constitution of a new assortment of diploid chromosomes made up from halves obtained from each parent and (2) Providing the necessary traumatic stimulus to initiate the process of embryonic development. Artificial parthenogenesis has enabled us to isolate the functions. This embryological background gives a basic outlook to view the problem of the possibility of trauma causing tumour. In embryology there is an instance of trauma

being a stimulus, and development and growth a response.

**Repair after trauma :—**

When embryonic tissues reach developmental maturity with concomitant complete morphological differentiation for specialized function, the rate of cell division is slowed down in the adult to replacement needs during the life span of the individual. This slowing of mitotic rate is attained by the operation of factors which are not fully known to us; they may be biochemical or hormonal or inherent in the genic mechanism. If, however there is a trauma that suddenly disturbs this quiescent state, the factors responsible for the subsequent tissue repair bring forth again conditions simulating the earlier embryonic stages, though not identical with them. This calls forth a cytological reaction which includes every aspect of the cell's morphology, dynamics, physiology and biochemistry. The alteration from the normal or quiescent state of the tissues is usually a passing phenomenon leading to restoration of normalcy as soon as complete repair is effected. But the possibility of such a shake-up from the natural to an accelerated tempo of growth causing segmentation and differentiation giving rise to transitory or permanent mitotic aberrations has to be borne in mind.

It has been recognised that different tissues have varying ability to survive nutritive privation and require differing thresholds of oxygen and blood constituents for their normal metabolism. For example, the mesoderm-derived tissue of the limbs can withstand avascularization for intervals upto 20 minutes when tourniquets are applied to limbs. But brain tissue cannot stand deprivation of nutrition even for a very short period. There are intermediate grades and degrees of tissue thresholds between these two. If embryonic tissue is now taken into consideration, its ability to withstand nutritive deprivation might be different from that of adult tissue. It is also possible that in a partly undifferentiated state a variation from normal vascular supply could affect the course of usual differentiation and give rise to substitution of one kind of tissue by another type provided both are derived from a common precursor cell.

Further, it has been experimentally shown in 1953 by Goldblatt and Cameron that fibroblasts could be induced to become malignant by subjecting them to repeated anaerobiosis (Moritz, 1954). The explanation generally offered is that the cells subjected to anaerobiosis acquire the ability to metabolize by anaerobic glycolysis, probably a latent biological faculty dormant in them. Subsequently even when the normal aerobic environment is restituted the cell might show a predilection to stick to its more primitive mode of nutrition though the ability was only recently acquired at a moment of nutritional vicissitude. To cite a homely example, we know an instance of a domestic cat that has been trained to be exclusively vegetarian, to refuse meat when later offered. There are many instances in psychology and physiology where activities acquired as a temporary expediency become fixed in the individual.

At a site of repair after trauma, every variety of vascular field-supply is likely to occur depending on the relative extent of vascularization and tissue growth at any particular spot. There is thus a potential cause for modification of the physiology of the cell as regards mitosis as well as differentiation.

**Trauma in cancer-predisposed animals :—**

Slye in 1927 concluded from experimental work that in a strain of tumour-susceptible mice subjected to trauma there was evidence to consider that the traumatized spots became cancerous sites; but other workers like Lubarsch, Marsh and Foulds have failed to correlate trauma and tumour formation (Moritz,

1954). The assessment of the evidence on the problem is at present indeterminate.

**Analysis of case histories :—**

Very frequently patients who seek treatment for any tumour, benign or malignant are likely to attribute the growth to a prior mechanical trauma as the cause. Mechanical injuries to the exposed parts of the body are very common and deeper structures and viscera may also be hit. Any abnormality is prone to be attributed to a prior injury at site. The association may only be coincidental. But the question is whether at least in a very very rare instance the two are correlated.

Behan in 1939 has provided some data from case reports (Moritz, 1954). The incidence of history of local trauma obtained from different groups of clinical material cited by him for some types of tumour is as follows :— bone tumours 33 to 67%; lung tumours zero to 13%; cancer breast 1·6 to 45%: malignant testicular tumours 11 to 97% etc. There are some studies available in which a history of injury at a site where a tumour developed subsequently could be well authenticated (Moritz, 1954). These include a wide variety of neoplasms at diverse sites. But the question could always be asked, was a minute tumour in initial stages present at the site prior to the injury? Then the injury becomes again a fortuitous coincidence and not an etiological factor.

**A latent period in tumour growth :—**

From the varying rates of growth of different types of tumours in diverse viscera, one can justifiably assume that the factors that determine the rate pertaining to cytological changes of initiation of a tumour and its further growth are not precisely known. If this be so, a prolonged latency could well be assumed in certain instances when a tumour cell after transformation could remain quiescent until stimulated to a new bout of renewed growth by some outside stimulus. In such instances no one can deny the possibility of trauma providing the necessary stimulus for a suddenly accelerated growth. Further, when a region is generally injured, it is not likely that only a particular biological cell is injured. It is rather a graded amount of injury to many neighbouring cells. A cell which is already abnormal is more likely to get injured consequent on a trauma than a normal healthy neighbouring cell. In this respect the greater susceptibility of abnormal tissue to injury has been accepted. Thus again, trauma might have a correlationship with tumour formation though not precisely etiological; it being considered that trauma stimulates a latent tumour cell to a new spurt of growth.

## Summary

As the process of tissue repair to an extent simulates embryonic developmental stages, the possibility of a tumour arising at a site of mechanical trauma is hypothetically present, though very remote. However, there is a greater possibility of a minute latent tumour-nest becoming stimulated to renewed growth due to mechanical trauma. The statistical, clinical and experimental evidence on this problem is very inadequate to give any definite answer one way or other. It is necessary to have more extensive and precise data on the subject, and every clinician can help in the problem by collection of authentic case histories.

## Reference

Moritz, A.R., The Pathology of Trauma, Second Ed. Lea and Febiger, Philadelphia, 1954.

# LEUKAEMOID REACTIONS

## A REPORT OF SIX CASES

*by*

M. S. NARAYANAN, *Tiruchirapalli.*

In a normal healthy individual, the leucocytes of the blood are functionless and circulate as mere passengers in the blood stream, undergoing, from hour to hour and day to day, rhythmic and orderly variations depending upon the nature of the physiological activity of the person. These normal variations, in disease, give place to more complex changes which bear a limited relationship to the site, nature and intensity of the pathological stress. Theoretically, therefore, each disease entity should provoke a distinctive reaction in and among the leucocytes, resulting in the production of a blood picture of its own. Since the number of such variations is limited, this does not obtain in actual observation, and diagnosis from a mere examination of the blood is difficult and liable to error. The capacity of the leucocytes to respond to even slight changes in the intensity of infections is, however, so great and delicate, that significant alterations in the blood picture can be observed with worsening or improvement of the clinical condition. This stoichiometric relationship between the severity of a lesion and the intensity of leucocyte reaction, in some cases, breaks down, probably due to the intervention of factors, the exact nature of which is not yet fully understood. The result is the production of a highly confusing, and at times, bizzare blood picture which bears no relation either to the clinical condition or the causative pathology. In such rare instances, the blood picture may very closely resemble that of the leukaemias. On account of this similarity, the term 'leukaemoid reactions' has been applied to describe the abnormal leucocyte responses. (Krumbhaar, 1926).

Leukaemoid reactions are characterised by the entry, into the blood stream, of immature and primitive forms of leucocytes, cell types which would not normally be found in the peripheral blood. The reaction is sometimes recognised by the magnitude of the leucocytosis, and at other times, by the morphological changes in the leucocytes which may be so extensive and complex as to be indistinguishable from the changes of leukaemia. Again, the advent of immature leucocytes into the blood stream may be accompanied by an influx of abnormal and neucleated red cells. If this happens in the presence of such constitutional signs as fever, haemorrhages and splenomegaly, a diagnosis of leukaemia is more than possible. (Hill and Duncan, 1941) Under such difficult circumstances, the only means of establishing a diagnosis of leukaemia is to find the typical reaction in the sternal aspirate or to find leukaemic infiltration of the tissues at autopsy. In leukaemoid reactions, though the peripheral blood shows gross abnormality, the haematopoietic centres do not share in the changes.

Leukaemoid blood pictures can simulate any one of the leukaemias acute or chronic, and have been reported in association with and as a result of a variety of clinical conditions. The myelogenous type is the most often encountered in connection with tuberculosis (Custer and Crocker, 1939) septicaemia, (Heck and Hall, 1939), diphtheria, meningiococcal meningitis, and pneumonia. The lymphogenous variety has been seen in association with tuberculosis, especially of the miliary

form or where the spleen or the lymphnodes are involved, chicken-pox, measles, whooping cough and infectious mononeucleosis. The least common of the reactions is the monocytic, and occurs, again, in conjunction with tuberculosis. (Gibson, 1946)

Severe grade burns, poisoning with heavy metals like mercury, (Downey *et al*, 1930), intolerance to the sulpha group of drugs (Whittmore and Stich, 1942), and mustard gas poisoning have been known to result in leukaemoid blood pictures. Malignancy, with or without bone metastasis, multiple myeloma (Krumbhaar, 1926). Hodgkin's disease (Burnam, 1927) and myelosclerosis produce similar reactions. Sudden profuse haemorrhage and sudden haemolysis of the blood have been responsible for some of the cases. In rare instances, drugs which would not ordinarily produce any reaction have, in some persons, been known to produce myeloid leucocytosis. (Ercklentz, 1935)

It is proposed, in this paper, to report a few instances of these abnormal reactions, observed during the course of a limited variety of clinical conditions. It is possible that the cases reported may not all be typical of leukaemoid reactions, but the reactions observed were unusual and abnormal and conformed to the criteria for the recognition of the reaction as nearly as possible, under the circumstances.

**Case No. 1.** R. V., a male diabetic aged 50 years, was admitted with a carbuncle of the chest wall, multiple abscesses, fever and tenderness over the splenic area. He was treated with infiltration of the carbuncular area with aquous penicillin, incision of the abscesses and injections of penicillin and insulin. On admission his blood findings were :

RBC: 3·71 millions per cmm, Haemoglobin: 70 %, Reticulocytes 1·6 %, WBC 12,600 per cmm, serum bilurubin 0·9 mg. %, icteric index 5 units, osmotic fragility of red cells to saline within normal limits. The differential leucocyte count was: Polymorphs neutrophils 61 %. late metamyelocytes 20 %, early metamyelocytes 5 %, myelocytes 1 %, lymphocytes 10 %, monocytes 3 % and eosinophils 0 %. There was intense toxic granulation of the neutrophils. There were no abnormal or neucleated red cells.

Till the fifth day of treatment, the clinical condition continued unchanged, when the patient suddenly developed dyspnoea while straining at stools, the dyspnoea improving only slightly under proper treatment. Blood findings soon after the attack were :

RBC: 2·41 millions per cmm, Hb 60 %, Reticulocytes 9·6 %, WBC 19,200 per cmm, serum bilurubin 2·8 mg. %. osmotic fragility of cells to saline increased. The differential leucocyte count showed : Polymorphs neutrophil 20 %, late metamyelocytes 28 %, early metamyelocyte 13 %, myelocytes 7 %, lymphocytes 23 %, monocytes 7 % and eosinophils 1 %. There was still intense toxic granulation of the neutrophils, involving the metamyelocytes also, a large number of orthochromatic normoblasts, polychromatic cells, a few spherocytes and a number of macrocytes were seen with basophilic stippling.

During the next 4 days, the condition remained unchanged, while there was a progressive decline in the red cell count and haemoglobin percentage, continued increase in the total leucocyte count with worsening regenerative neutrophilic shift to the left, increase in reticulocytes, abnormal erythrocytes and neucleated cells and increased osmotic fragility of red cells. On the fifth day after the acute attack, the patient died suddenly before a whole blood transfusion could be arranged.

This case is illustrative of an acute infective haemolytic anaemia of the type described by Lederer (1930), supervening on a septic lesion. The characteristic features are the rapid decline in red cell count and haemoglobin percentage with increasing signs of haemolysis. The mounting leucocytosis, the worsening shift to the left of the neutrophils, the appearance of immature leucocytes, the normoblastic crisis with influx of abnormal red cells, together with the fever, splenic tenderness and respiratory distress would suggest a leukaemic process. Though only a sternal puncture would have definitely decided a diagnosis, in this case, the rapid development of haematological incidents with a known infective background would more incline to a reading of leukaemoid reaction than the irreversible condition of leukaemia. The sudden development of macrocytosis is of interest as Joules and Masterman (1935) mention instances where the blood picture may closely simulate that of pernicious anaemia in relapse.

**Case No. II.** K.C., a 49 year old male was admitted with debility, glossitis, occasional diarrhoea, anorrhexia and stocking type of oedema. Examination of the blood showed a macrocytic anaemia with moderate leucopenia. Sternal biopsy showed a typical megaloblastic hyperplasia with classical Ehrlich's megaloblasts, giant metamyelocytes and immature megakaryocytes. Gastric analysis under histamine stimulation showed only faint traces of free acidity in the gastric contents, The patient was treated with daily injections of 15 mg. of folic acid and routine daily blood-checks showed satisfactory reticulocyte response and improvement in general condition. But, the leucocytes showed a peculiar reaction from day to day, as follows :

| Day. | WBC. | Segmenter. | Late Meta-myelocytes. | Early meta-myelocytes. | Myelocytes. | Lympho. | Monos. | Eos. |
|---|---|---|---|---|---|---|---|---|
| 0 | 4,800 | 66% | 3% | 0% | 0% | 26% | 2% | 3% |
| 1 | 9,400 | 53 „ | 6 „ | 0 „ | 0 „ | 28 „ | 3 „ | 10 „ |
| 2 | 14,200 | 48 „ | 9 „ | 4 „ | 2 „ | 25 „ | 6 „ | 6 „ |
| 3 | 22,000 | 43 „ | 10 „ | 8 „ | 9 „ | 18 „ | 8 „ | 4 „ |
| 4 | 23,600 | 44 „ | 15 „ | 10 „ | 10 „ | 15 „ | 4 „ | 2 „ |
| 5 | 20,800 | 50 „ | 6 „ | 4 „ | 3 „ | 24 „ | 5 „ | 16 „ |
| 6 | 11,800 | 51 „ | 6 „ | 0 „ | 0 „ | 22 „ | 2 „ | 19 „ |

After a sharp rise in the number of normoblasts during the first four days of treatment, there was a steady fall in their number, till, on the 6th day, only stray cells could be seen. There was no sign of haemolysis at any stage of the observation, the patient not belng clinically any worse for the abnormal leucocyte response.

Sensitivity reactions to crude and refined liver extracts in the treatment of megaloblastic anaemia have been widely reported in literature. Except for a report of myeloid leucocytosis following administration of liver extract in a patient with pernicious anaemia in relapse (Ercklentz, 1935), no abnormal leucocyte reaction is mentioned in connection with therapy with folic acid or vitamin B12. Commenting on this case, Israels (personal communication) feels that such reactions are frequently seen in England also, resulting in polymorph leucocytosis and morphological changes in some of the non-tropical megaloblastic anaemias.

Since the condition involves the granulocyte-forming cells as well as the erythroblasts, the changes are perhaps not surprising. It is of interest to speculate on the possible bearing this abnormal reaction may have on the reported corrective effect of folic acid in agranulocytosis. (Black and Stanbury, 1947).

**Case No. III.** K. V., a diamond polisher aged 26 years was admitted with a history of a single bout of haematemesis the previous day. There was nothing in the history to suggest a haemophilic state, nor was there any family diathesis. No poisoning was suspected. Except for a slight prolongation of the bleeding time, no coagulation defect could be detected with the tests employed. He had a slight rise of temperature in the afternoons, and the spleen was palpable under deep inspiration. On admission, blood showed:

RBC: 4·01 millions per cmm, Haemoglobin 13·5 gm.%, Reticulocytes 2·6 WBC 18,200 per cmm. Differential leucocyte count showed polymorph neutrophils 66%, late metamyelocytes 13%, lymphocytes 13%, monocytes 5%, eosinophils 1% and basophils 2%. There was moderate polychromasia, but no neucleated red cells. Osmotic fragility of red cells was within normal limits. Sternal puncture chowed a very marked and intense normoblastic hyperplasia with a large number of reticulocytes in the marrow under vital staining.

The patient was put at rest and given an injection of morphia. There was no further incident till the next evening when he had another bout of haematemesis, followed in quick succession by epistaxis, bleeding per anum and finally, haematuria. Three blood counts done serially on these two days showed:

| WBC. | Segmenter | Late meta-myelocytes | Early meta-myelocyte | Myelocyte | Lymphos. | Monos. | Eosin. |
|---|---|---|---|---|---|---|---|
| 22,600 | 61% | 17% | 3% | 0% | 11% | 5% | 3% |
| 33,000 | 48 „ | 24 „ | 10 „ | 10 „ | 6 „ | 0 „ | 2 „ |
| 37,800 | 40 „ | 29 „ | 12 „ | 11 „ | 7 „ | 0 „ | 1 „ |

The first of these counts was done before the large bleedings. From the second of these counts, a large number of normoblasts had appeared in the blood with polychromasia and basophilic stippling. At this stage 300 cc. of compatible whole blood was transfused and the blood counts, the first of which was done immediately after the transfusion and the others every 24 hours showed:

| WBC. | Segmenter. | Late meta-myelocytes | Early meta-myelocyte | Myelocyte | Lymphos. | Monos. | Eosin. |
|---|---|---|---|---|---|---|---|
| 36,600 | 44% | 27% | 10% | 6% | 11% | 1% | 1% |
| 17,400 | 48 „ | 20 „ | 3 „ | 1 „ | 18 „ | 8 „ | 2 „ |
| 14,400 | 50 „ | 17 „ | 0 „ | 0 „ | 20 „ | 7 „ | 6 „ |
| 9,800 | 54 „ | 8 „ | 0 „ | 0 „ | 24 „ | 5 „ | 9 „ |

*N.B.*—Normoblasts disappeared from the blood on the last count.

The appearance of a leukaemoid blood picture following severe haemorrhage has been reported by Krumbhaar (1926). The case is of interest in that no cause for the bleeding could be ascertained, nor could any coagulation defect be detected with the limited means of investigation. Apart from the presence of immature neutrophils in the peripheral blood, the low grade temperature, the small enlargement of the spleen, extensive haemorrhage and the influx of abnormal and neucleated red cells in the peripheral blood which would act as strong pointers to a diagnosis of a leukaemic process, the clinical condition or the history were not suggestive of the disease. The patient is, after two years, in very good physical condition and has had no recurrence of the trouble. As a matter of curiosity, his serum was assayed for vitamin B12 content and showed a value of 336 micromicrogrammes per cc. The serum B12 concentration in myelogenous leukaemia is about 15 times the normal value of 350 micromicrogrammes per cc. (Beard *et al*, 1954) The quick response to a transfusion is noteworthy, since, in contrast to true leukaemias, it demonstrates the reversibility of the reaction.

**Case No. IV.** V. O., a 22 year old young man with a history of three previous admissions to hospital for acute appendicitis, presented with an acute exacerbation of 72 hours duration. He had a very painful, tender, inflammed and rigid right iliac fossa and had not passed either wind or stools for the prior 24 hours. Had a high temperature, vomiting and signs of toxaemia. He refused immediate operation against advice. The blood findings taken at frequent intervals during his stay in hospital for two days were:

| Day | WBC | Segmenter | Late meta-myelocytes | Early meta-myelocytes | Myelos | Promyelos | Lymph. | Mon. | Eos. |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 19,400 | 56% | 29% | 2% | 0% | 0% | 12% | 1% | 0% |
| | 19,800 | 51 ,, | 32 ,, | 3 ,, | 0 ,, | 0 ,, | 11 ,, | 3 ,, | 0 ,, |
| | 26,600 | 41 ,, | 36 ,, | 12 ,, | 4 ,, | 0 ,, | 6 ,, | 1 ,, | 0 ,, |
| | 31,000 | 30 ,, | 41 ,, | 14 ,, | 9 ., | 2 ,, | 4 ,, | 0 ,, | 0 ,, |
| 2 | 28,000 | 22 ,, | 49 ,, | 14 ,, | 10 ,, | 4 ,, | 1 ,, | 0 ,, | 0 ,, |

After the last count, the patient developed a very rapid thready pulse, broke out into a profuse sweat and appeared to be sinking. Breathing was laboured, but, after a transient cessation of pain, the patient was in agony. This was probably the point when the appendix had ruptured and peritoneal soiling had commenced. Blood counts taken at one hour interval, the second being just before death, showed:

| WBC | Segmenter | Late meta-myelocytes | Early meta-myelocytes | Myelos | Promyelos | Lymph. | Mon. | Eos. |
|---|---|---|---|---|---|---|---|---|
| 17,000 | 14% | 48% | 19% | 13% | 6% | 0% | 0% | 0% |
| 14,400 | 8% | 42% | 24% | 17% | 9% | 0% | 0% | 0% |

During an earlier study, (Kalamegham *et al*, 1950) the changes in the blood picture which occur in the course of acute appendicitis from its first incidence, through the stages of chronicity, suppuration, and perforation were described in some detail. The present case illustrates the changes that take place when the pathology is allowed to progress to its inexorable end. The points deserving mention in this instance are the progressive regenerative neutrophilic shift to the left, the mounting leucocytosis and the gradual elimination of the non-granular elements from the blood. The sudden, relative fall in the leucocyte count, synchronising probably with the perforation and consequent peritonitis, with liberation of the more immature of the cells into the blood stream constitutes a leukaemoid reaction of the type described by Gradwohl (1956) as the Gay or Liberation picture observed in the terminal stages of an acute infection. The 'biological leucocyte curve' seen in this case illustrates the various phases of defence, progression of infection, mobilisation of the body defences and the final breakdown of all resistance.

**Case. No. V.** During the small-pox epidemic of 1957, a very high rate of mortality was observed. The majority of them died even before eruptions were observed, and such cases had haemorrhages from some region or other, a common finding being subconjunctival ecchymosis. The blood picture differed from the usual text-book description on account of the hyperleucocytosis, and a leukaemoid picture involving the lymphocytes even in the early stages of the illness.

Mrs. L, a young lady of 22 years was admitted with high temperature, toxaemia, headache, vomiting and severe pain over the joints and bones. Though initial blood counts were done in a number of these cases and showed a uniform pattern, it was only in this one case that serial blood counts be taken. These were:

| Day | WBC | Segmenters | Late-meta-myelocytes | Early meta-myelocyte | Myelos | Lymphos | Monos | Eos. | Basos |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 26,800 | 12% | 9% | 0% | 0% | 58 ( 7)% | 18% | 3% | 0% |
| | 32,400 | 10% | 7% | 2% | 0% | 64 (10)% | 12% | 3% | 2% |
| | 34,200 | 5% | 11% | 3% | 2% | 70 (14)% | 6% | 0% | 6% |
| 2 | 63,800(a) | 0% | 4% | 6% | 10% | 76 (19)% | 1% | 0% | 3% |
| | 66,000(b) | 0% | 1% | 2% | 13% | 82 (26)% | 0% | 0% | 2% |

(*a*) Count taken one hour after onset of haemorrhage.

(*b*) Count taken one hour later and shortly before death.

Figures in parenthesis indicate the number of 'irritation' and immature lymphocytes and plasma cells.

From the onset, the blood showed a large number of normoblasts, basophilic stippling, polychromasia, thrombocytopenia and marked evidence of neucleolysis.

The lymphocyte type of leukaemoid reactions have been reported following chicken-pox (Goldman, 1930), but there is no mention of similar reactions associated with small-pox. The classical average blood picture described by Gradwohl (1956) consists of hyperleucocytosis, regenerative neutrophilic shift to the left with monocytosis and the inclusion of plasma cells in the picture. This case materially differs from the description in the absolute lymphocytosis, the rapid decline in the number of monocytes as the disease progressed and steady

disappearance of the myeloid elements from the blood picture except for the more immature forms. The deviation from the usual blood picture was perhaps modified into a leukaemoid reaction by the haemorrhagic complication.

**Case No. VI.** M.M., a male aged 47 years was admitted to the wards with anorrhexia, epigastric tenderness and heaviness after food, occasional vomiting not relieving the pain, progressive debility, emaciation and splenomegaly. Laboratory investigations showed :

RBC 2·61 millions per cmm, Haemoglobin 9·3 gm. %, PCV 30% cells, Reticulocytes 5·9%, osmotic fragility of red cells to saline increased, serum protein 7·74 gm. %, A/G ratio 1 : 2·17, serum alkaline phosphatase 47·5 King and Armstrong units, plasma cholestrol 360 mg. %. ESR Westergren 115 mm. in one hour. Gastric analysis under histamine stimulation showed only faint trace of free acid in the contents. No organic acids or Oppler-Boas bacilli were seen.

Total leucocyte count was 91,600 per cmm. and consisted of myeloblasts 6%, promyelocytes 10 %, myelocytes 17 %, late and early metamyelocytes 29 %, segmenters 19 %, lymphocytes 10 %, monocytes 2 %, eosinophils 6 %, and basophils 1%. The picture was macrocytic and showed a large number of normoblasts and polychromatic cells. Peroxidase staining showed 68·4% of the cells to be positive for the reaction. Sternal puncture revealed intense normoblastic activity with a number of giant metamyelocytes and 'intermediate megaloblasts' (Dacie and White, 1949), a number of promyclocytes and other cells of the series. There was no change in the megakaryocytes. Cells, considered to be of extrahaemopoietic origin were found singly and in groups. These had pale blue hyaline cytoplasm without granules, with neuclii showing a fine reticular chromatin pattern and multiple large neuceoli. Independant opinion was divergent on the identity of the cell, but one is inclined to classify them as due to secondary deposits of a primary neoplasm elsewhere.

Radiologically, a filling defect under barium meal showed the presence of cancer of the pyloric end of the stomach.

The findings, both in the blood and bone marrow were unchanged after transfusion of 300 cc. of whole compatible blood.

At this stage, the patient left hospital for private reasons, and returned a month later in a much worse condition than before. Investigations showed a worsening of the anaemia, an increase in the number of myeloblasts in the blood, while the bone marrow, this time, showed marked leukaemic changes, indicating the development of myeloblastic leukaemia. The total leucocyte count had increased to 220,000 per cmm.

Though the blood picture and the bone marrow pattern at the very first admission were very suggestive of leukaemia, there were no typical myeloblasts in the marrow while there were quite a number in the peripheral blood. Again, the cells in the marrow as well as in the blood were normal in their morphology and no 'hiatus luekaemicus' of Naegeli was seen, the latter finding being a constant feature of acute myelogenous leukaemia. The morphology of the mature and immature cells had remained normal in both blood and marrow and this finding inclined in favour of a leukaemoid reaction rather than true leukaemia in which paraforms are fairly abundant. (Hill and Duncan, 1941 ; Reinwein and Rosing, 1938) Leukaemoid reactions in connection with cancer of the stomach have been reported by Bichel (1949) but the reaction was entirely lymphatic.

Myeloid reaction to cancer either of the stomach or of the colon with metastasis in the spleen (Meyer and Rotter, 1942) has not been reported. In the present instance and in view of the later development of leukaemia, it is a matter for speculation whether the reaction was a result of the malignancy or was an independent reaction. The latter appears improbable on account of the absence of any other lesion of any significance.

The development of the leukaemic process is of interest in this case. We have no evidence to show that a leukaemoid reaction could develop into a true leukaemia, though a suggestion has been put forward by Engelbreth-Holm (1954) on the possibility of the leukaemoid reaction being the benign tumour of the blood, while the leukaemias were the malignant ones or the ' haemosarcomata '. (Bessis, 1956) The coexistance of cancer of the stomach and leukaemia has been extensively reviewed and Moertel and Hagedorn, (1957) report that out of 120 cases where malignancy and leukaemia or lymphoma coexisted, only three cases of cancer were found with chronic myelogenous leukaemia, while 12 were seen with chronic lymphatic leukaemia. No association of an acute form of leukaemia with malignancy is reported by these workers.

**Discussion:**

There is a school of thought which believes in the infective origin of leukaemia and feel that all abnormal leucocyte reactions are one stage or another of a leukaemic process. It is however clear that some differentiation between the reaction and true leukaemia is possible and necessary. In leukaemoid reaction, the anatomy of the marrow space is maintained in a normal state, while in leukaemia, the proliferation is both arrhythmic and disorderly. The leukaemoid reactions, are, following as they do, some infection or intoxication, reversible. On this score alone, the leukaemoid reactions should be recognised when they occur and adequate steps taken to reverse it. It is admitted that these are rare occurrences, but the important point to remember is that they do occur.

It is not possible to make any definite conclusions on a few instances of this reaction, even allowing for the fact that they may all be leukaemoid reactions. But, there seems to be some difference between the cases that, on account of an actual enlargement or mere tenderness of the area, suggest involvement of the spleen, and those which do not show evidence of splenic pathology. In those where the spleen is suspected of being involved, the picture is of a polyphasic involvement of all the leucocyte series, while in the others, only one leucocyte type is concerned at the expense of the others. Whether this would obtain in a larger number of cases is a matter of doubt.

**Summary.**

1. Leukaemoid reactions are defined and the literature quoted on their occurrence.

2. Six cases of possible leukaemoid reaction are described in connection with infections of various kinds and one instance of drug reaction.

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# *ADVANCES IN THERAPEUTICS

*by*

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WITHIN recent years so much progress has been made in therapeutics that it is difficult to deal with all of them. Another difficulty that one encounters in tackling such a subject as this is to decide where to start. The year 1935 inaugurates an important era in medicine and therapeutics because it marks the introduction of the sulphonamides. followed rapidly by antibiotics, corticotrophin and cortisone, and various other notable achievements in therapy.

**Sulphonamides** :

Sulphapyridine (M & B 693) is one of the early sulphonamide preparations used extensively in treatment. But because of its toxicity it has been replaced by sulphathiazole (Thiazamide. M & B 760, Cibazol). This preparation is rapidly absorbed, less toxic, but has the disadvantage of being quickly excreted from the system. It was, therefore, followed by sulphadiazine and sulphamerazine which are slowly absorbed and slowly excreted, but with the disadvantage that they crystallise in the urinary tract and may thus cause anuria. Sulphamezathine, which does not crystallise in the urinary tract, is of value in the treatment of dehydrated patients. Succinyl sulphathiazole, phthalyl sulphathiazole (Thalazole, M & B) and sulphaguanidine are preparations which act locally without being absorbed from the gastro-intestinal system. As such they are of use in dysenteries and diarrhoeas. One disadvantage of the sulpha preparations is that they are, after absorption from the intestines, distributed throughout the body. In order that these preparations may be concentrated specifically in tissues where their action is required most, further modifications are made in their composition. As a result of this it is now possible to get a concentrated action of the sulphas in the urinary tract with sulphacetamide for B. coli infection (Gantrisin, Urolucosil) and in the lungs in pneumonias with Elkosin (Ciba). The other disadvantage of sulpha preparations viz. crystallisation in the urinary tract, resulting in the suppression of urine flow, has been circumvented by the finding that a combination of sulphas can be given in a higher dose with less danger of anuria than with a single preparation. This observation has resulted in the development of newer preparations like sulphatriad, which is a combination of sulphathiazole 37%, sulphadiazine 37% and sulphamerazine 25%. It may be mentioned that Vitamin B complex inhibits the action of the sulphonamides and as such should not be given with sulpha preparations.

**Acetazoleamide**. Work on the sulpha group of drugs has resulted in the discovery of Acetazoleamide (Diamox). Diamox which is a sulpha derivative, is found to be particularly effective as a diuretic in congestive heart failure cases, in glaucoma of the eye and recently in emphysema of the lungs and in epilepsy. Its action is said to be due to the inhibition of an enzyme–carbonic anhydrase. Acetazoleamide was discovered from the observation that sulpha group of drugs when given to cases of congestive heart failure had a beneficial effect. The strength of Diamox is 250 mgms., given once or twice a day. Acetazolaemide is, however, contra-indicated in cases of ascites with cirrhosis

* Based on a lecture delivered at the annual meeting of the Salem Branch of the Indian Medical Association.

of the liver. where instead of producing diuresis it may cause hepatic coma.

**Sulphonyl-urea Compounds.** Further work on sulphonamides has now resulted in another great achievement. Two preparations Carbutamide (BZ 55, Invenol Nadisan) 0·5 Gm. per tablet, and Tolbutamide (D 860, Rastinon, Artosin) are now in use in the treatment of diabetes mellitus by the oral route. It was the observation of Watanabe that the administration of sulphaguanidine caused a fall in the blood sugar in rabbits, which led to the introduction of sulpha derivatives in the treatment of diabetes mellitus. It may be mentioned here that patients suitable for this oral therapy of diabetes mellitus are those who are above 40 years age: who need insulin of 40 units or less; are of the slightly obese type : and with a blood sugar of below 300 mgms. %.

**Sulphones.** The other derivatives of the sulpha compounds are Sulphones, Thiosemicarbazone and other drugs which were used initially for the treatment of pulmonary tuberculosis and are now found to be of more value in the chemotherapy of leprosy. The parent substance, Diamino diphenyl sulphone, (D. D. S.) has led to various modifications, prominent among which are sulphetrone and diasone. D. D. S. is absorbed almost completely from the alimentary tract, is cheap and least toxic. It is, therefore, widely used in the treatment of leprosy, which is mostly a poor man's disease. Sulphetrone, however, is suitable for mass injection treatment. Injection treatment is sometimes preferred to oral therapy in leprosy because one can then be sure that the drug has been administered. This is of importance because leprosy being such a slowly crippling disease that the sufferers often forget to take their daily tablets.

**Antibiotics** :

The year 1944 marks an important era in Medicine. It inaugrates the era of antibiotics. Penicillin was the first antibiotic to be introduced, and in spite of numerous other antibiotics now in vogue, still remains the best and most widely used. It is least toxic, cheap, and has the added advantage that resistant forms do not develop so easily. Penicillin, however, has the disadvantage that it is destroyed by the gastric acidity. The newer Phenoxymethyl penicillin-Penicillin V, has been found to be easily absorbed from the intestines, escaping the acidity of the stomach contents. V penicillin is of extreme value in paediatrics. V penicillin is the only form of penicillin which is prescribed by weight, 60 mgms. being equivalent to 1,000,00 units. The action of penicillin can be prolonged by suspending it in oil, with or without aluminium monostearate (PAM–Dumex). Benzathine penicillin (Diamine penicillin-Dumex ; Penidure-Wyeth) is also of value because the penicillin level in blood is maintained for a week to 21 days after injection. Hence it is particularly of value in the prophylaxis of acute rheumatic fever. As ester of benzyl penicillin – diethylamino ethyl hydrochloride penicillin–is found to be effective in lung conditions because it is concentrated in the lungs. Such preparation is available in the form of Estopen (Glaxo).

It was believed wrongly that a combination of antibiotics will always be more effective than a single antibiotic. It is now found that while in some combinations two or more antibiotics can act better than a single one, in other combinations the action of one antibiotic may be completely nullified by the other. Thus we have synergism and antagonism in antibiotics. It is well known that streptomycin and penicillin are synergistic in action i.e. they act better when combined together (Strepto - penicillin - Dumex ; Seclomycin-Glaxo ; Dicrysticin-Squibb). Aureomycin and penicillin, however, antagonise each other and are, therefore, never given together. The

effect of chloramphenicol is enhanced by combining it with streptomycin in the treatment of diarrhoeas (Chorostrep-Parke Davis). It may be stated here that streptomycin and dihydrostreptomycin are usually combined together to lessen the toxic effect of each. Streptomycin has been found to be very effective in the treatment of plague in high doses (1 Gm. to 2 Gms. every 4 hours) and in B. coli infection of the urinary tract. Chloramphenicol (Chloromycetin-Parke Davis; Synthomycetin-Le Petit) is the most effective antibiotic in enteric fever. It is also of value in whooping cough and influenzal meningitis. The tetracycline group viz. Achromycin (Tetracycline) Aureomycin (chlortetracycline) and Terramycin (oxytetracycline) have a wide range of action and are used in many conditions. But the danger of antibiotic therapy is the overgrowth of fungi as a result of the suppression of the normal bacterial flora of the gastro-intestinal system. This is seen in the form of black, furred tongue, the development of thrush (moniliasis) or ano-genital irritation (pruritus). Recently Nystatin, which is an antifungal substance elaborated by Streptomyces noursei. is found to be active against Candida albicans and is therefore used in the treatment of moniliasis. It is available as Mysteclin (Squibb).

**Para Aminosalicylic Acid and Isonicotinic Acid Hydrazide:**

In the fight against tuberculosis one of the important weapons that we now have is Isonicotinic acid hydrazide (I. N. H.) available as 50 or 100 mgms. tablets. It is not toxic and does not irritate the gastro-intestinal system, a feature which is noted with para amino-salicylic acid. It is found to concentrate particularly in the lungs and skin, diffusing into the dense caseous tuberculous tissues. Euphoria, psychosis, twitching of muscles are some of the side-effects of I.N.H. therapy. Para aminosalicylic acid is of particular value when combined with streptomycin (10 to 15 Gms. P. A. S. per day by oral route with 1 Gm. Streptomycin as intramuscular injection). Combining streptomycin with P.A.S. or I.N.H. is found to inhibit the development of streptomycin resistant forms of tubercle bacilli, and also lessen the toxic effect of streptomycin therapy.

**Antimalarial Drugs** :

Great strides have been made in the therapy of malaria. Quinine, a cinchona derivative, which was the first drug used in the treatment of malaria, was followed by Pamaquine in 1926 and Mepacrine in 1930, both synthesised in Germany. We now have a series of other anti-malarial drugs. Proguanil (paludrine) is relatively free from toxicity and is of value in combating the exo-erythrocytic cycle of malignant tertian malaria. It is available in strengths of 0·1 and 0·3 Gms. tablets. 4-aminoquinoline compounds (Chloroquine, Nivaquin, Resochin, Camaquin) are rapidly absorbed from the gut and are very slowly excreted. They are very effective both as suppressants and as curative agents, particularly in P. falciparum infections (malignant tertian malaria). A new drug which is now used in the treatment of malaria is Pyrimethamine (Daraprim-Burroughs Wellcome) It is tasteless. The tablet is small, 25 mgms., tasteless and is, therefore, easily administered to children. It has the additional advantage of being a prophylactic i.e. acting on the sporozoites introduced by the mosquitoes and on the exo-erhthrocytic forms in the liver. It is a suppressant and a curative.

**Amoebicidal Drugs :**

Chloroquine, which is an anti-malarial drug, is also found to be effective in the treatment of amoebic hepatitis. It is concentrated to a great extent in the liver in cases of amoebic infection and is of value in this condition. Iodooxy quinoline (Chiniofon) containing 25% iodine,

Iodo-chlorhydroxy quinoloine (Enterovioform) containing 40% iodine Diiodohydroxyquinoline (Diiodoquin) containing 60% iodine are used in the treatment of intestinal amoebiasis. Aureomycin and Terramycin 1 Gm b.d. for 7 days are the antibiotics which are effective in the treatment of amoebiasis. Pentavalent arsenicals (Carbarsone, Leucarsone, Stovarsol) available as 250 mgms. tablets, containing 20% arsenic are also of value in amoebiasis, their beneficial effect being due to the arsenic which acts as a tonic to the system. Of late combinations of Bismuth and Arsenic (Milibis). Bismuth, Arsenic and Chloroquine (Bisaren with chloroquine-Alembic), are found to be very effective in the treatment of amoebiasis.

**Antihelminthics-Piperazine :**

One of the great advances made in therapeutics is the finding in 1947 of Carbamazine i.e. piperazine hydrochloride (Hetrazan, Banocide). This drug is given in the dose of 2 mgms. per kilogram of body weight three times a day after meals for three weeks in filariasis ; 6 mgms. per kilogram of body weight three times a day for 7 day for ascariasis and 50 to 70 mgms. per kilogram body weight per day for the treatment of pin worm infestation. It has also, of late, been found to be useful in the treatment of Tropical Pulmonary Eosinophilia, the dose required being 13 mgms. per kilogram of body weight per day for 14 days.

**Antihistaminics :**

Of late antihistaminics have come into importance in the treatment of many allergic conditions like Bronchial Asthma, Urticaria etc. It must be emphasised that antihistaminics do not act by neutralising the histamines. They act by competing with histamines and attaching themselves to the tissue cells, thereby preventing the entry of histamines into the tissues. Most of the antihistaminics produce sedation, the degree of sedation varying with the different preparations. Thus low sedation is produced by Antistin, moderate sedation by Pyribenzamine, Histadine and high sedation by Benadryl, Phenergan, Dramamine etc. In selecting a suitable antihistamine the physician has to bear in mind as to whether a certain degree of sedation is required side by side with the antihistaminic effect or not. In Bronchial Asthma, for example, with severe dyspnoea Benadryl and Phenergan are the drugs of choice. In mild asthmatic attacks where the patient has to carry on with his normal work Antistin is the drug of choice. As a general rule it may be said that antihistaminics with low sedation have a high tablet strength (for eg. Antistin 100 mgms.), while antihistaminics with moderate sedation have a low dosage (Benadryl 50 to 100 mgms ; Phenergan 25 to 50 mgms.).

**Tranquillisers :**

The work on antihistaminics has led to the discovery of newer products in which the sedative effect is used rather than the antihistaminic effects in treatment. To such a group belongs Chlorpromazine (Largactil, Equanil, Anxine etc.). These drugs are in strengths 10, 25 mgms. largactil, and 400 mgms. equanil and are found to be of particular value as tranquillisers. They are used to calm the mentally agitated and nervous patients. They quieten the maniacs and steady the nerves of the highly-strung individuals. Largactil is used extensively nowadays to check nauseas and vomiting. It is also used to control his coughs. But it must be remembered that Largactil can cause liver damage and should not be used if the vomiting is due to infective hepatitis or other causes in the liver. Largactil and Phenergan are administered together with Pethidine as pre-operative medication.

**Antihypertensive Drugs :**

Perhaps the greatest advance made during recent years is the finding of newer

antihypertensive drugs. Rauwolfia serpentina which was used originally as a whole root preparation, was later partially purified (Rauwiloid, 2 mgms. tablets), and the purified single alkaloid, Reserpine (Serpasil–Ciba) is now used in the treatment of hypertension. Rauwolfia causes mental sedation. This, besides the antihypertensive effect, is of value in the treatment of hypertension. Reserpine is also used in psychiatry. The ganglion-blocking agents eg. Hexamethonium bromide, Hexamethonium chloride (Vegolysen – M & B), Pentolinium Tartrate (Ansolysen 10 & 40 mgms. – M & B) are useful hypotensive drugs, but have the bad effect of producing constipation, dryness of the mouth, postural hypotension etc. A combination of the hexamethonium group and Rauwolfia derivatives is used extensively in the treatment of hypertension. Phthalazine derivatives (Hydralazine hydrochloride–Apresoline–Ciba) are found to be a potent hypotensive drugs when combined with Rauwolfia. Such a combination is available as Adelphane (Ciba). Starting with 10 mgms. t.d. the dose of Hydralazine can be increased to 300 to 400 mgms. daily. Rheumatoid arthritis, nausea and vomiting are the toxic effects of phthalazine derivatives.

**Coronary Vasodilators :**

Of value in the treatment of angina pectoris we have now numerous drugs. Glyceryl trinitrite tablets is very rapidly acting, but its action is not a prolonged one. To have sustained and prolonged action we now have Pentaerythrityl tetranitrate (marketted as Peritrate 10 to 20 mgms). Dioxyline phosphate (marketted as Paveril Phosphate 0·1 & 0·2 gm. Lilly) which are found to be of use in anginal attacks, Khellin, an extract from an Egyptian plant Ammi Visnaga (Khellicardin – Raptakoss Brett), Papeverine are other substances found to dilate the coronary vessels.

**Peripheral Vaso-Dilators :**

While substances like Peritrate Paveril phosphate etc. act mostly on the coronary blood vessels, drugs which act as peripheral vaso-dilators are used in the treatment of arterio-sclerosis producing giddiness, claudication and in thromboangitis obliterans. Tolazoline hydochloride 25 to 50 mgms. (Priscol, Priscophen–Ciba) belong to this group.

**Newer Atropine Derivatives :**

From atropine which is used extensively to relieve spasm of smooth muscles, pylorospasm of peptic ulcer, bronchial spasm, renal colic etc, we have newer derivatives which are used in the treatment of different conditions. Belladonna, which was found to be effective in Parkinson's Disease, has now been followed by other atropine derivatives like Parpanit. Artane etc. Similarly Methantheline bromide (Banthine 50 to 100 mgms.) Methscopalamine (Pamine–Upjohn) and Oxyphenonium (Antrenyl–Ciba, 5 mgms,) are used in the treatment of peptic ulcer to diminish the acid secretion and to lessen the spasms of the muscles round the ulcer. Adiphenine hydrochloride (Trasentin - Ciba) relaxes the smooth muscles and is used in the treatment of colic.

**Adrenaline Derivatives:**

Derivatives from adrenaline have resulted in the finding of Amphetamine sulphate (Benzidrene) and Amphetamine dextrosulphate (Dexerdrine, 5 mgms.) used as stimulants to the respiratory centre and as antidotes to narcotic poison. These are, therefore, given combined with barbiturates and antihistaminics to counteract the drowsiness produced by them. Dramamine is a combination of an antihistaminic and amphetamine. Methidrine (Methamphetamine–Burroughs Wellcome) is similarly a cortical stimulant. Noradrenaline is a preparation used to raise the blood pressure, particularly after a full in the blood pressure, following a coronary attack. It causes a parallel rise both in systolic and in diastolic pressures,

Pholedrine (Veritol–Knoll) is similarly used to combat the fall in blood pressure resulting from shock and peripheral failure. Isoprenaline, which is an isopropyl derivative of nor-adrenaline, is used in the treatment or Bronchial Asthma (Isoprenaline–Boots). The pressor action of noradrenaline is minimal with this preparation. Thus while the bronchial spasms are relieved there is no corresponding rise in blood pressure. It is therefore of value in the treatment of hypertensive asthmatic patients.

**Insulin** :

After the initial discovery of insulin by Banting and Best we have now newer preparations which are used for prolonged action of the insulin. A suspension of insulin with protamine and zinc using phosphate as a buffer (Protamine Zinc Insulin) was found to give a prolonged effect lasting from 14 to 48 hours. A modification of this, where the protein is not bound to the insulin, which remains unaltered, and can act for a longer time, is a preparation Neutral Protamine Insulin by Hagedorn Laboratories (N. P. H. Insulin). This acts from 12 to 30 hours. Insulin bound to globin instead of protamine is known as globin insulin. It has a quicker but a less lasting effect than N. P. H. or P. Z. I. insulin. Its action is between 10 to 24 hours. In Denmark Hallasmoller and his colleagues used acetate instead of phosphate in the zinc suspension of P. Z. I. thus avoiding the use of protamine. These preparations are now available as Lente insulin, acting from 12 to 30 hours; ultraente insulin which is made of crystals the action being slow, lasting between 16 to 40 hours ; and semilente insulin comprising of amorphous insulin, which acts quicker, being the same as for ordinary insulin i.e. 4 to 10 hours. The use of sulphanyl-urea compounds (Carbutamide and tolbutamide) in Diabetes Mellitus has is already been discussed.

**Anti-Thyroid Drugs** :

The treatment of hyperthyroidism is now advancing rapidly. Starting with Lugol's Iodine, which was the only armamentarium available till recently against this condition, we then had Thiourea, which had to be abandoned because of its nauseous taste, in favour of the Thiouracil compounds. Methyl and Propyl thiouracil, are less toxic and have a smaller dosage (200 to 500 mgms.). Further development has resulted in the isolation of Imidazole (Tapazole, Neomercazole) which are now used in the treatment of thyrotoxicosis. These substances have smaller doses (10 to 40 mgms. a day). But, their toxicity is the same as that of methyl and propyl thiouracil.

**Vitamins and Antivitamins** :

The discovery of vitamins is one of the most important strides in medicine. Recently Folic acid, belonging to the Vitamin B complex group, and sometimes known as vitamin M, has been found to be of value in the treatment of macrocytic anaemia, sprue, and other conditions. It is given in doses of 5 to 10 mgms t.d. Vitamin B 12 also known as cyanacobalamin (Macrabin, Anacobin) is another member of the Vitamin B complex group discovered recently. It contains cobalt. It has been found to have all the properties of the extrinsic factor required for haemopeoitic activity. It is available as tablets, syrub, or injections, 50 to 1000 mcgms. being given at a time. It was accidentally discovered in 1938 that antivitamins, which bear a close structural similarity to the vitamins, antagonise the action of the vitamins and make them ineffective. For example, a nicotinic acid antagonist made nicotinic acid deficiency (pellagra) worse. Similarly thiaminax made thiamine deficiency worse. An antifolic acid preparation—Aminopterin—is now used to counteract the excessive white cell proliferation that takes place in leukaemia.

**ACTH and Cortisone** :

Corticotrophin (ACTH), an anterior pituitary extract, and Cortisone may be considered as one of the important

advances made in therapeutics. ACTH acts by stimulating the suprarenals to secrete cortisone. It is, therefore, a stimulant therapy. Cortisone, on the other hand, replaces or acts in addition to the Cortisone secreted by the suprarenals. It is a substitution therapy. ACTH is available as injections for administration by the intravenous or intramuscular routes. 20 to 40 mgms. may be given. Cortisone is available as tablets for oral administration (50 to 200 mgms. a day) and as injections. It can also be used for subconjunctival injection. It is said that 100 mgms. of ACTH cause the release of 200 mgms. of Cortisone. Hydrocortisone, which resembles cortisone, is of more value for instillation into the eyes, local application to the skin and injection into the joint cavity. By introducing a fluorine atom into the hydrocortisone molecule, a tremendous increase in the anti-inflammatory potency takes place. But this increased therapeutic benefit thus obtained with Fluoro-cortisone is offset by the greatly increased sodium retention which takes place when this preparation is administered. Further modifications in 1954 resulted in cortisone analogues viz. Prednisone and a hydrocortisone analogue viz. Prednisolone (Deltacortil). The effect of these two substances is the same as that of cortisone and hydrocortisone. But this is obtained with a much smaller dosage. These newer substances are particularly of value in rheumatoid arthritis. They do not cause a rise in blood pressure, a disadvantage which is encountered with cortisone, and can, therefore, be given in cardiac, hypertensive and elderly patients. It may be mentioned here that cortisone therapy should be given with caution in tuberculous conditions where it may activate a latent focus. Peptic ulcer, diabetes mellitus and acute mania are other conditions which may be aggravated by cortisone therapy.

**Phenyl Butazone :**

Phenyl butazone (Irgapyrin, Butazolidin) is used nowdays extensively in various forms of painful bone and joint conditions, Rheumatoid arthritis, Osteoarthritis. Its action is similar to that of Amidopyrine. It causes epigastric pain, vomiting, headache, diarrhoea, renal failure, agranulocytosis and hepatitis. It should, therefore, be given with great caution.

**Plasma Substitutes :**

For replacement therapy following haemorrhage, shock etc. blood plasma, concentrated red cells, whole blood, are, of course, ideal. But because of the difficulty in obtaining these, 6 % acacia in normal saline which has the same osmotic pressure and viscosity as blood, is used. But the gum in this preparation interferes with the $CO2$ - $O2$ exchange and, therefore, newer plasma substitutes are now being prepared. One such is a carbohydrate polysaccharide namely Dextran, which is available as a 6% solution. Dextran is retained in the body for about a week. A plastic synthetic polymer viz. Polyvinyl pyrrolidone (Plasmosan, Periston and Plasmex) is found to be a safe and effective substitute for blood.

In an article of this nature it is difficult to decide where to start and where to end. Many preparations which do not come in the daily use of the practitioner eg. BAL, Pronestyl (which is used in the treatment of ventricular fibrillation), anticoagulants like Heparin, Dindevan, Tromexan, have not been included in this article. Medicine is progressing so rapidly of late that what is considered to be an important advance today may be relegated to the background after a few days. Nevertheless, our achievements have been so great what we can tackle today with confidence cases which our forefathers would have hesitated to approach. We can now challenge and prove wrong the famous words of Oliver Wendell Holmes who said " If all the drugs in the pharmacoepia are thrown into the ocean it will be all the better for mankind and all the worse for the fishes. "

# THE GENERAL PRACTITIONER AND SURGICAL EMERGENCIES IN OUT OF THE WAY PLACES

*by*

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EMERGENCIES may arise in out of the way places where elaborate investigations are not possible and the patient too ill to be transported. The patient's chances of survival under such circumstances depend upon the physician's clinical acumen, and his ability to act quickly improvising things with whatever is on hand. Some very simple methods may go a long way for e.g. acute flexion of the elbow or the knee joint or the thigh on to the abdomen may immediately arrest haemorrhage from a wound in the forearm or in the lower limb. Again, merely raising both the lower limbs vertically at the groin may increase considerably the blood pressure in an intensely shocked patient. The statement below applies to marked fall of blood pressure after spinal anaesthesia, but it applies to a certain extent to patients in shock due to other causes. " One should remember that the lower extremities of the average patient under anaesthesia (particularly under spinal anaesthesia and caudal anaesthesia) contain about 700 c.c. of blood. This blood can be instantaneously poured into the circulation if the lower extremities are raised to right angles with the long axis of the body to permit a gravity autotransfusion. This simple technique has restored blood pressure within 30 seconds as high as 40 m.m. of Hg. in a great many patients. This method is far more efficient than the simple Trendelenburg position." (From Pitkin's " Conduction Anaesthesia ").

## Anaesthesia

A good knowledge of regional and local anaesthesia will be of immense help. With these, many operations can be done single handed or at any rate with the minimum of trained assistants. Critically ill patients are often unfit for general anaesthesia and even more so for spinal anaesthesia. The latter has a further limitation in not being ordinarily applicable to operations other than in the abdomen and lower extremities. Local anaesthesia can be safely used for any patient however ill, and is the safest for operation on patients with cardiac, renal or pulmonary disease. As to the anaesthetic agent employed, it is largely a question of what one is familier with. Novocaine is perhaps still the one most frequently used, but newer and newer drugs with clains of longer duration of anaesthetic effect and less toxicity are coming into the field. Whichever agent is used, one must have knowledge of the maximum quantity of the drug that can be safely used and the antidote should any toxic symptoms develop. Sterile solutions of anaesthetic agents ready for use are available in rubber capped bottles and they should always be kept in the emergency kit, a bottle or two.

It is best to carry two sets of syringes (in case a syringe breaks in an out of the place) with needles of various sizes and lengths to fit. and provided with bayonet catches (Labat's or Pitkin's sets are examples). As regards the anaesthetic agent xylocaine available as 2% solution in bottles of 2 oz. is an example. This can be diluted with distilled water to make 1% or ½% or ¼% solutions. The 1% solution will do to block the main nerves (regional block, also called conduction anaesthesia) ½% in the line of

the incision and $\frac{1}{4}$% for diffuse infilltration (infilltration anaesthesia) acts very well and the anaesthetic effect lasts for two to two and a half hours.

## Examples of the Method

(*a*) *For operations on the upper extremities : Brachial plexus block* — The patient lies flat on his back. A skin wheal is raised at a spot over the middle of the clavicle. The left index finger is placed over the third part of the subclavian artery and its pulsation felt just above the clavicle, external to the outer border of the sternomastoid. An unattached 4″ Labat's needle is now introduced downwards and backwards through the skin wheal towards the first rib when the resistance of the brachial plexus as it lies on the first rib is felt. The syringe is now attached and after making sure by aspiration that no vessel has been entered into, the anaesthetic solution is injected. The needle is withdrawn and introduced towards the transverse process of the 6th cervical vertibra and a further quantity of anaesthetic solution is injected. A total quantity of about 15 to 20 c.c. of 2% novocaine or 1% xylocaine will do. In some cases smaller quantities will suffice. If the injection is actually into the nerve plexus, the anaesthetic effect will be immediate ; if around the plexus, it takes a longer time to act (may be 10 to 20 minutes). But this latter method is safer. If the inner aspect of the upper arm has also to be anaesthetised, the intercostobrachial nerve must be blocked or local infilltration of the area carried out. For the outer aspect of the upper arm quite high up, the supra-clavicular nerves also must be blocked. *Under brachial block even extensive injuries of the arm, forearm and hand can be attended to. For about 40 to 45 minutes the patient has loss of sensation but power of movement is retained. This is a great advantage.* The patient can be asked to move his fingers, hand or forearm and this helps the operator to judge and suture the appropriate ends of cut tendons as the retracted ends are brought into view during these movements. Even if it is felt that suture of cut tendons or nerves is best left to the expert, to be done at a latter sitting, the operator can arrest all bleeding, attend to debridement and toilet of the wound, set fractures, and make notes of the extent and nature of the damage for his future reference or for the information of the doctor to whom he is referring the case. I have used this method fairly often and have found it very useful, particularly in compound fractures of the forearm or arm where injection of solutions into the vicinity of the wound is risky.

Dangers and complications of the method.

(1) Injury to the lung and surgical emphysema—This injury can easily be avoided by withdrawing the piston before injection. If the needle is in the apex of the lung, air will be drawn. Withdraw and change the position of the needle. Even if this complication occurs, it is not a dangerous one and the emphysema will get absorbed.

(2) Occasionally, phrenic spasm occurs, I had an example of this in a hospital case and the patient cried out in an extreme agony of pain. Fortunately the dispensery was close by and amyl nitras capsules were urgently procured, on inhaling which the pain passed off and the patient felt comfortable. However, with ordinary care, complications are unusual and the method can be adopted with safety.

(*b*) Local infiltration of anaesthetic solution into the haematoma for recent simple fractures. The area is cleaned and the anaesthetic is injected into the haematoma at 2 or 3 points round the limb, away from the site of big blood vessels. That the needle is in

the haematoma is judged by withdrawing blood which at the same time does not come as rapidly or continuously as it would if the needle was inside the blood vessel. Success in the method depends upon injecting the novocaine into the haemotoma, particularly near .and between the fractured ends. Colles's fractures, fractures of both bones of the forearm, fractures of the clavicle, etc., can all be set under such anaesthesia. The patient is in great comfort and manipulation of the fragments can be done deliberately and slowly. *As he is conscious, he co-operates in keeping the limb in particular positions required. Application of plaster with the limb held in the desired position therefore becomes much simpler*, an advantage that can be easily appreciated by these who have tried manipulating and immobilizing fractures in an unconscious patient, and with not enough assistants.

(*c*) *For hernias particularly strangulated hernias (inguinal and femoral).*— The patient may be in severe shock and far away from the nearest hospital. Transport of such patients over bad roads must inevitably aggravate the symptoms and may even contribute to a fatal termination. It will be best to operate then and there whenever reasonably possible, and the operation can ideally be done under regional block— the technique for the purpose is evident from Fig. 1. A few hours delay may bring on gangrene of the gut in a strangulated hernia. If conditions are not favourable for operation, in cases where the strangulation is not more than about 4 to 6 hours in duration, administration of ¼ grain morphia, raising the foot of the bed and giving a soap and water enema may result in spontaneous reduction. Operation may in such cases be postponed till more favourable conditions are obtainable. As "taxis" in any form is avoided by the above method, it is free from danger. In cases longer than 4 to 6 hours in duration and in all cases where gangrene is suspected, operation should be done without depending on the above method.

(*d*) A good knowledge of field block for *abdominal operations* will be of great help. Fig. 2 shows a method for upper abdominal operations.

Intercostal block of the lower 6 intercostals on either side in midaxillary line is a useful technique, but care should be exercised to see that the needle does not enter the pleural cavity. Failure in this precaution may cause pneumothorax or even total collapse of the lung. While it must be easy to take this precaution, instances are on record where bilateral collapse of lung during such infiltration has resulted in the death of the patient. With ordinary care such disasters are avoidable. The method by itself is a good and useful one. However the technique shown in fig. 2. is safer and better adopted if one is not familiar with the intercostal technique. At any rate the intercostal technique is not the one to be adopted for the first time in situations under consideration here.

(*e*) Operations upon the thorax - Rib resection for empyemas and even more expensive operations involving the resection of several ribs can generally be carried out under regional anesthesia.

**Blood Transfusion.**

The one and only way of saving a patient who has lost much blood as a result of injury or bleeding ulcers (peptic ulcer and the like) or due to whatever cause is by replacing the blood. It may be needed in other conditions leading to shock as in burns, in hypoproteinaemic conditions etc.

I would unhesitatingly say that this valuable method can and must be adopted much more frequently than is being done now. Blood transfusion is

possible even in an out-of-the-way place. The requirements are :—

1. Donor.

2. Test for compatibility.

3. Wide-bore, sharp, short-bevelled needle (French's or Keyen's or Cantis or Jubes' or any similar needle) with an attached rubber tubing about 8″ long.

4. Sterile liquid paraffin.

5. Sterile sodium citrate solution — 20 c.c. ampules of 4% solution are readily available in the market.

6. A bottle with a mark at 50 c.c. (for citrate solution up to the mark) and another up to 500 c.c. (450 c.c. of blood drawn).

7. Intravenous saline apparatus.

8. Syringes and (2% novocaine) anaesthetic solution.

9. Two or three plaster of Paris bandages to support the limb in a plaster mould when giving the blood transfusion.

Regarding the "donor", years ago, I wrote in this connection that it may not be easy to induce even the nearest relatives to give blood. I am glad to say that my recent experience in a place where emergencies often arise goes to show that the fears expressed are unfounded. Relatives have willingly come forward to donate blood and several lives have been saved because of their generosity. In no case was a patient lost for want of blood because of want of donors. Difficulties did arise in some cases because of blood groups not matching. It has been an even more happy experience that in all cases the donation was voluntary. No payment was necessary in any single instance. The patients were all of the poor classes and belonged to the so called uneducated class.

As regards the test for compatibility, if the microscopic method is done, it is all the better. A drop of the blood of the donor is added to the serum of the recipient and if the corpuscles do not agglutinate but remain discrete or show only rouleux formation, the blood is compatible. If the corpuscles get clumped, the blood is incompatible. If a miscroscope is not available, the naked eye method can be adopted with safety, provided that one takes the trouble to get experienced with the method. If a drop of blood of the donor is added to the serum of the patient (recipient), in a watch glass and no brick red deposit occurs, the blood is compatible. All that is required are two small clean test tubes, two clean watch glasses and a sterile ink-filler or pipette. The details of blood transfusion cannot be entered into here but the method is quite easily picked up and details can be obtained from any text book of surgery. The whole outfit for testing and for transfusion (except the microscope) can all be packed ready sterilised in a medium-sized dressing drum. The corpuscles of the donor (C. D.), that is, his drop of blood is tested with the serum of the recipient (S. R.), viz., the patient. The method of transfusion is perfectly practicable and not particularly difficult. With the use of blood transfusion, many major operations may become possible and safe even in patients run down in health while without its use such operations may be very risky if not impossible. Of course, one is all for organization of blood banks, plasma banks etc. in hospitals but what I want to stress is, that for conditions outlined in this article blood transfusion is practicable and is an extremely useful and important adjunct.

**Where blood is not available.**

(*a*) As a second best arrangement and in all dehydrated patients, administration of saline by the *intravenous drip* method must be readily possible. Sometimes the drip may have to be kept up for several days and in such cases it is advantageous to pass a narrow polythene

tube well up the vein. The procedure is particularly useful in children. Sterile ampoules of various solutions—normal saline, 5% glucose saline, 5% glucose in distilled water, solutions of so called " plasma expanders " etc.—are all readily available in the market conveniently packed for immediate use. Even if these are not available, in practice, if one is sure of the sterility of the solutions prepared in one's own dispensary, a mild rigor is of no great moment. If the rigor is not severe or prolonged, administration of the solution need not be discontinued. Rigor can usually be prevented by the use of pyrogen-free distilled water. Incidentally, it is worth while pointing out, that where sterility is assured, it is the use of copper vessels and connections and / or inferior rubber tubings (especially synthetic rubber tubings) that produce pyrogen products.

(*b*) Intramuscular drip saline (in preference to subcutaneous infusion)—Many pints of the solution can be introduced by this method, without great discomfort. This is a very useful method and deserves to be more popular than it now is. It is best administered deep intramuscularly into both thighs in preference to intramammary or axillary infusions. It is preferable to subcutaneous infusion, as absorption is quicker and discomfort is much less. (see also " use of hyalase " below.)

(*c*) **Use of hyalase** :— This is very useful particularly in dehydrated patients, and in particular in infants and babies. Hyalase is an enzyme which helps rapid absorption of fluids. It is first injected subcutaneously (1 to 2 c.c. for an adult) in the axilla, abdomen or thigh and into that area the subcutaneous saline is introduced. Rapid absorption of fluid is brought about. In a few minutes several ounces will be absorbed. This is imperative in children brought in extremely ill due to gastroenteritis or starvation and vomiting in congenital pyloric stenosis. The dehydrated child with sunken eyes will soon show such an improvement that it will be difficult to believe that one is seeing the same child so gravely ill before.

(*d*) **Administration of fluids into the bone marrow** — The sternum or the medial aspect of tibia are useful sites for this purpose. Under local anaesthesia, a stout sharp needle is introduced piercing the cortex and the drip apparatus is connected to the needle. Even blood transfusion can be given by this method in an infant where no vein is available, or even in adults with severe collapse. Of course meticulous care about aseptic technique is essential.

(*e*) Intragastric-drip feeds — This again is a very useful method, particularly where no intravenous apparatus is available, or where the patient is very restless, and in unconscious patients (say after head injury). Requirements for adopting this method are — a Ryle's tube, drip attachment, clip, and reservoir. The patient can be fed with fluids of various sorts, — milk, buttermilk. weak tea with plenty of sugar, fruit juice, glucose water, saline, plain water, etc., etc. This is a very useful method in dehydrated and starved patients, particularly if they are stuporose or unconscious. In cases where frequent nasal feedings are required, intragastric drip feeds may be a better alternative, with less strain on the patient as well as on the nursing staff.

Incidentally, *it is worthwhile pointing out than an ordinary, large stomach tube can be passed down through the nose.* This is a fact which deserves to be known more commonly. It is particularly useful in violent or unconscious patients. No forcing open of the mouth by gags are required, and there is no danger of the finger being bitten. This is a method worthwhile remembering for washing out the stomach in cases of poisoning, especially if the patient resists or bites the tube, which he may do if he is delirious or

deliberately in cases with suicidal tendencies. The big stomach tube cannot be left in as long as a Ryle's tube for feeding purposes, but where the latter cannot be passed, the stomach tube can be utilised for an emergency feed. If the tube (well lubricated with vaseline, or any oil and not glycerine; glycerine is not a lubricant) cannot be passed through one nostril, the chances are that the septum is deflected to one side and the tube will very likely pass through the other nostril.

**Seriously Injured Patients.**

If patients are severely injured in an out of the way place, all possible measures must be taken to counteract shock before they are transported. If they are rushed away before recovery from shock has occurred, any little chance they might have had of survival will be lost. I know of cases where patients with severe injuries (e.g., a crushed thigh with compound fracture) had been rushed to a nearby headquarter hospital in a bus. Some of the patients died, not because of the injury but because of the added shock in transport in a jolting bus without any immobilisation of the limb or a preliminary morphia injection.

The following steps should help to counteract shock :—

(*a*) Administration of morphia liberally ($\frac{1}{4}$ to $\frac{1}{3}$ grain in an adult, repeated as necessary, keeping a watch on the pupil and respiratory rate). In shocked patients, the morphia should not be indiscriminately repeated, for when shock improves, the entire amount which till now remained unabsorbed because of poor circulation, may get absorbed all at once, with undesirable consequences. If immediate effect is required, it is better to give the morphia or pethidine intravenously. It should be injected slowly and with a careful watch on the respiration.

(*b*) Administration of plenty of fluids (by one or other of the methods already described).

(*c*) Arrest of haemorrhage - Wherever possible, the use of a tourniquet must be avoided and bleeding arrested by direct ligature of vessels. To apply a tourniquet instead of ligating a superficial cut vein is criminal. If a tourniquet is at all used, it should be a broad flat rubber bandage (Esmarch's bandage) or a pneumatic tourniquet. Rubber tubings must be avoided. The tourniquet must be removed at the earliest opportunity, and preferably not kept longer than 40 to 45 minutes. The tourniquet should be applied as low as possible above the level of the wound. It should be loosened for a few minutes at intervals of 15 minutes. Venous bleeding can always be controlled by pressure and elevation and never requires a tourniquet (Illingworth, 1952). The use of a tourniquet in the upper limb is more risky than in the lower and more risky in children than in adults. Some limbs, which could otherwise have been saved, have had to be amputated because a tourniquet had been applied so tight and had been left so long that it had dug deep into the tissues and the limb had to be amputated at that level for a trivial injury which could otherwise have been easily attended to. The moral is that if a tourniquet is at all necessary, apply it not too high above the level of injury and do not leave it on too long.

(*d*) Immobilization of the injured part—This is a most important necessity, which should not be over looked under any circumstances. For example (*a*) bringing together the margins of wounded areas with elastic plaster. (The strapping should extend well beyond the limits of the injured areas, if immobilization is at all to be effective). (*b*) Plaster slabs or application of Thomas Splints and skin traction for injured limbs. Thomas's splints saved thousands of lives during first World War. Its use was popularised by Sir Robert Jones, and was considered a major advance in the treatment of fracture femur. " The Tobruk " plaster, which utilized the Thomas splint, was

found to be very useful in the second World War. Yet the use of the splint is being nearly forgotten.

In applying skin traction, strappings, must not encircle the limb, but must be applied as concentric halves at opposite aspects, at different levels of the limbs. Pressure over the heel and over bony prominences must be avoided. Foot support to prevent foot drop must not be neglected. Sometimes it may be better to immobilise the limb applying the splint over the cloths before transporting the patient (e. g. a simple fracture of femur in Thomas splint).

(*e*) Principles of treatment of open wounds are on the usual well known lines, viz. cleaning of the surrounding skin, after covering the wound with sterile gauge and shaving the limb away from the margins of the wound. It is no use shaving a small area around. The whole limb must be shaved, and it is the only way of removing all gross dirt. The limb must then be washed liberally with soap and water, and dried. This process itself may have to be done under anaesthesia in some cases. The wound is then next attended to, cleanly excising the skin margins and deeper infected layers, removing foreign bodies and blood clots and effecting haemostasis. The suture of divided important structures may be necessary now, or by delayed primary or secondary suture later, according to various conditions. Application of sulphonamide and / or penicillin locally and parenterally must be according to necessities of individual cases.

Many wounds so treated in the first few hours do well. It is known, that up to 6 hours organisms lie on the surface of the wound, when it is called a contaminated wound, as against wounds seen at later hours, when the organisms get a hold on the deeper structures via the blood vessels and lymphatics, when the wound is said to be infected. In wounds seen late, or where excision of all infected tissues has not been possible, leave the wound widely open, loosely packed with vaseline gauge. Drainage tubes are best avoided specially when patients have to be transported.

Avoid dry dressings and such cruel methods as swabbing abrasions with tincture of iodine or sealing them with tincture benzoin. These cause pain which is entirely avoidable. Sealing abrasions inpedes free escape of discharge and also causes pain at the time of its removal. The wounds are best covered with flavine gauge (1 in 1000 aqueous solution, soaked in paraffin or vaseline) and strapped over. This immobilizes the injured area and removal also is painless. Prophylactic anti-tetanic serum injection must not be forgotten and should be administered at the earliest opportunity.

**Injuries in Special Situations.**

1. Head Injuries - A well planned and methodical examination is necessary for a quick and correct assessment of the condition of the patient. The degree of consciousness, condition of the pupils, paralysis or paresis of limbs, if any, reflexes (superficial and deep), nature of breathing whether sterterous or otherwise, etc. must be noted. The pulse rate, respiration and blood pressure must be taken every half hour and charted graphically. Particularly the temperature (in stuporose and unconscious patients, the rectal temperature) should be taken every half hour because *as shock is controlled the temperature may rise rapidly and reach damaging levels. Hyperthermia may be easily controlled in the early stages : but not so, when well established.* I shall refer to this again later.

Particular care must be taken not to overlook other injuries, in an unconscious patient. I know of a case where, in a

patient with a head injury, a severe fracture of the jaw was missed and death occurred not due to the head injury, but due to asphyxia–the result of falling back of the tongue.

**Important Points in Treatment of Head Injuries:**

(*a*) Maintenance of proper air way — If this is neglected, all other supporting measures will be thoroughly defeated. The head must be turned to the side to allow the saliva, mucus, etc. to flow out freely, an airway tube inserted to prevent the tongue from falling back and the mucus and blood aspirated off. The common practice of swabbing the throat with a gauze or cotton swab held in a pair of forceps should be thoroughly deprecated. It causes great discomfort to the patient and also does not remove the mucus efficiently. The most pleasant and effective way is to aspirate it off with a syringe or a bulb attached to rubber tubing.

**Tracheotomy** may occasionally be required in severe head injuries, complicated by facial and mandibular fractures with so much oedema and swelling that it is difficult to maintain a satisfactory airway.

Incidentally, in institutions where available, administration of oxygen with B. L. B. mask will help very much and if oxygen is given it must be given at the rate of 6 to 8 litres per minute. If cyanosis is not controlled by these measures, the possibility of a pneumo-or haemothorax must be remembered.

(*b*) Prevention of hyperpyrexia – Hyperpyrexia may be a dangerous and unexpected complication of head injuries. To avoid this, one must aim at keeping the rectal temperature below 102° F. If temperature is rising up, eliminate all clothings and turn on the fan (if electric fan is not available, the patient must be fanned by attendants). Ice bags to the axilla and groins may be applied, but if these do not bring the temperature down, a good way to control it is by '*alcohol-sponging*.' A large basin of alcochol is filled with ice and every 15 minutes, the exposed parts of the body are thoroughly moistened with iced-alcohol and the electric fan turned on to evaporate it. Now and again the unconscious patient is turned so that the back also can be like-wise cooled. I have had no opportunity of adopting this method, but I do feel in retrospect that some of the patients might have been saved, had it been adopted. It is recommended by Sheldon and others (1944) and I bring it to the notice of the profession as worth adopting.

(*c*) Control of Intracranial pressure. There is considerable difference of opinion regarding the adoption of dehydration therapy in head injury. Some maintain that the dehydration treatment should be carried out as a matter of routine, while others stress that dehydration is not only unnecessary but might be harmful at times (Pritim Das - 1954). At any rate dehydration therapy is being looked upon with less favour. Obviously it is contraindicated in patients who are in a state of shock and have a low blood pressure. In selected cases, lumbar puncture may be done with benefit. When pulse rate is slow (50 to 60) lumbar puncture is done to determine the pressure and the presence of blood in cerebro-spinal fluid. About 5 to 10 c.c. of the fluid are removed and if the condition improves, it may be repeated. *Lumbar puncture is contraindicated when the pulse rate is high and the patient is in deep coma.*

During recovery, lumbar puncture may be beneficial in relieving headache, meningism and irritative phenomena resulting from accumulation of blood in the subarachnoid space.

(*d*) Fluid balance and nutrition – In comatose patients, unless particular care is taken, nutrition may suffer. A Ryle's or Levin's tube may be passed through the nose into the stomach and fluids e. g.,

glucose water, fruit juice, citrated milk etc., may be introduced and a chart kept of the fluids given so that a correct idea of feeds provided may be available. At least 1500 c. c. of fluid per day should be administered in the early period and possibly even more if the weather is warm.

Restlessness – If patients are restless among various other causes, a distended bladder may be one, in which case catheterisation is required. Luminal, pheno-barbitone, paraldehyde etc. may be used to allay restlessness.

Emergency operations in cases with head injury. – If the patient is restless, intravenous pentothal sodium may be used with benefit. Otherwise it is possible to do these operations under local and regional block. The indications for emergency operation and the details of the operative technique cannot be gone into here. But the main principles are the same as in attention to wounds elsewhere. Open injuries with or without injury to the skull, intracranial haemorrhages, etc., will require urgent operation. Sulphathiazole is the one among the sulpha group of drugs which should not be used locally in cerebral wounds, because it causes fatal convulsions when in contact with cerebrospinal fluid (Geoffrey Jefferson, 1945). For systemic administration, sulphadiazine and / or penicillin may be used.

### Chest Injuries.

2. (*a*) **Injuries of the heart and great vessels** :— Large wounds of the heart and great vessels are immediately fatal. What follows, applies to cases where injuries are less serious but the patient may even be in extremis. It is generally agreed that wounds of the heart should be operated upon if there is continuous bleeding to the outside or into the pleural cavity. When on the other hand there is acute cardiac tamponade without external bleeding, open operations are better defered until the effects of at least one pericardial aspiration have been determined (Blalock, 1951). It has been found that majority of such patients will respond favourably to one or more aspirations. The bleeding into the pericardial cavity may not recur and an operation may not be necessary in every such case.

The characteristic signs of acute cardiac compression are (Beck's triad for acute compression) :—

(1) A small quiet heart.

(2) Rising venous pressure.

(3) Falling arterial pressure.

Aspiration is done by directing the needle upwards and backwards through the angle between xyphoid process and left costal margin ; or backwards through a point about 2 cms. to left of sternal margin in the 5th interspace or close to left sternal margin, so as to avoid the internal mummary artery. Of all these various points mentioned, that just to the left of the xyphisternum is more frequently adopted. Dangers in tapping are injury to the internal mummary artery and coronary vessels or to the heart wall itself. The needle used must have a short bevel and a fairly wide bore. The tapping can be done under local anaesthesia.

The pericardium may have to be explored in some cases. The triad of findings justifiable for pericardial exploration are :—

(1) A wound over pericardium.

(2) No evident pulse or blood pressure.

(3) Faeces and urine in under wear. This last finding (according to Elkins) is symptomatic of extreme relaxation of sphincters which is rarely observed in other severe thoracic injuries during the life of the patient.

It is no use waiting for recovery from shock. With simultaneous administration of fluid (and blood if available) the operation must be proceeded with, and bleeding may be arrested. If the heart muscle is torn, bleeding is controlled by digital pressure over the opening, and

the torn margins are brought together with mattress sutures. Care must be taken to avoid coronary vessels. If they are in the way, they must be avoided by under running mattress sutures. Sometimes the local application of an absorbable haemostatic sponge such as gelfoam will control oozing which is otherwise uncontrolable.

(*b*) **Open chest wounds**—By way of first aid the following treatment is suggested :—

(1) In open wounds, arrest haemorrhage in superficial wound.

(2) Apply penicillin sulphonamide powder to the wound.

(3) Close a sucking wound by a wet dressing or pad of gauze smeared with vaseline and kept in place by strapping, if the wound is small or by suturing the margins over the gauze, if the wound is large.

(4) If the ribs are fractured in two places "Stove in chest", as in crush injuries and there is a mobile chest wall, infiltrate the fractured areas with novocaine and strap the chest wall, the strapping taking a purchase of the chest wall on the healthy side i.e., strapping must extend well beyond the midline front and back. If this is insufficient, pass sutures round two or three ribs and tie them over a metal bar supported on two rubber sponges or gamgee pad on the chest wall (Roberts, 1940). Alternatively simple weight and pulley traction using towel clips may be tried (Proctor, et al, 1955).

"Stove in chest" is fortunately a rare type of injury, but is a serious injury because it results in paradoxical respiration disturbing respiratory and cardiovascular functions. It may be associated with intrathoracic and intraabdominal injuries and the patient must be examined for these. In some of these cases the patient may not be able to cough up secretions. In others, blood may accumulate in the air passages in some type of injuries. Serious ventilatory insufficiency may occur because of these. In such cases, a tracheostomy will be of considerable help and can be done under local anaesthesia. This will diminish the dead space by about 100 c.c. thereby improving alveolar ventilation (Bjork, et al, 1955), Repeated aspirations through it keeps the trechea and bronchi emptied of secretions. Trecheatomy under such conditions may be a life saving measure.

(5) Embarrassment of breathing may be due to other causes like pneumothorax, possibly tension pneumothorax, haemothorax etc. These are best treated by aspirating off the air or the blood. In tension pneumothorax, the second intercostal space in front is a convenient place to insert the needle, and connected to underwater drainage.

(6) It may be worth mentioning here that the best way to treat fractured ribs is by novocaine infiltration into the painful area or by blocking the related intercostal nerves. A single injection often gives permanent relief, though in some cases it may have to be repeated once or twice at intervals. *This is a much better, simpler and more comfortable method, than the time honoured one of strapping the chest wall.* (Neal Smith, 1942, Mahadevan, 1944). The rationale of the method is as follows. It is well known that in fracture of ribs the maximum pain is during the inspiratory phase, when the inspiration is suddenly checked at a certain stage by a catching pain at the fractured area. It is not during the expiratory phase which should be the case, if pain is due to the fractured ends rubbing together. The pain is due to the spasm of the intercostal muscles and this is relieved by the injection of the anaesthetic solution.

Further, strapping the chest, particularly in the elderly, limits respiratory excursion and favours stagnation of secretions. It impairs coughing up of secretions and directly favours hypostatic

pneumonia. *It is evident from these statements that strapping as a method of treatment of fractured ribs must be abandoned.*

**Burns.**

3. (*a*) The treatment of extensive burns has really become simplified after the advent of potent antibiotics. The area is insufflated with penicillin sulphanomide power and covered over with sterile vaseline gauze and immobilised with plaster slabs or elastic pressure bandages. The dressings are not changed until the 10th to 14th day after burns. Adequate doses of morphia to relieve pain and penicillin and other antibiotics to counteract sepsis are essential. While it is well known that plasma transfusion is required in extensive burns, what is not so well known is that blood transfusion also is required in such cases. So much of R.B.C's are destroyed in extensive burns that blood transfusion is very necessary in addition to plasma transfusion, to overcome shock. Debridement of the burnt areas in the method outlined above is unnecessary and no anaesthetic is required. *Too many deaths in the past, in cases of burns, have been due to the anaesthesia given for cleaning and debridement of the burnt areas.*

In the early cases, blebs need not be snipped. In fact snipping them only opens up the way for infection. If they come late with sepsis the problem than is different. The blebs are abscess cavities and the pus must be let out. The treatment in such cases is that of an extensive septic wound.

(*b*) The nutrition of the patient is kept up by proper feeds-plenty of easily digestible proteins and aminoacids, Vit. " C " in particular and other Vitamins. These patients become very anaemic and hypoproteinimic and these must be counteracted by adequate doses of Fe. and blood transfusions.

(*c*) Early skin grafting is necessary to prevent chronic sepsis, contractions and deformities. *Even in the presence of mild sepsis, skin grafts do take.* Early skin grafting by excising all 3rd degree burns preferably within 6 weeks is a very important step. Some advice immediate skin grafting in complete skin loss burns.

(*d*) Chronic infections, particularly that resist sulphonamide and penicillin treatment are mainly due to B. coli, B. proteus and B. pyocyaneus infection. Culture reports, tests for sensitivity, and resistance to antibiotics will help to decide the appropriate antibiotic required e. g. streptomycin. terramycin etc.

4. **Acute Abdominal Conditions**—The following points seem worthy of mention :—

(*a*) In lesions due to perforation of viscera, e,g., duodenal ulcer perforation, the patient has severe pain, the abdomen is regid, palpation is painful and patient is immobile, whereas in colics, the patient rolls about in agony and pressure tends to be more soothing than uncomfortable. In intestinal colic, the pain is all around the unbilicus, whereas in biliary colic it is in the right side and in renal colic in one or the other side of the abdomen. Further, there is the characteristic radiating pain in biliary or renal colics which helps in diagnosis. In volvulus of the pelvic colon pain is in hypogastric region.

(*b*) Recently, there is a tendency to adopt conservative measures in some case of perforation of duodenal ulcer, which consists mainly in Fowler's position, continuous suction drainage of alimentary tract, liberal morphia, continuous intravenous drip glucose saline and administration of sulphonamides and penicillin. The method has been in vogue for a long time especially in cases where the area of rigidity was limited to the upper right quadrant, in the so-called leaking ulcers. I have known my chiefs adopt this method at least as early as 1934, successfully in some cases and where symptoms did not rapidly improve operation was resorted to. Anyhow this method can be very usefully adopted in suspected perforations

where there are no facilities for operation or at least till operation is possible. Where conditions permit, operation is perhaps safer, and in addition the above methods can be adopted as useful adjuncts.

(*c*) **Acute Intestinal Obstruction**—Intestinal decompression combined with parenteral administration of fluids can act as a life saving measure. The easiest way of intestinal decompression is to pass a Ryle's tube (or a Levine's. tube) through the nose into the stomach and attach it to a Wangensteen's suction arrangement (which can easily be rigged up with 2 bottles, rubber and glass tubings) or periodical aspiration with a big syringe—(an ear syringe or bladder syringe may be useful, but a 20 c.c. syringe will usually do).

Intestinal decompression by itself is not a cure. It may work ideally and may be all that is required in paralytic ileus or in acute or chronic obstruction due to inflammatory swellings or kinks and adhesions of the bowel. In others it is useful in making a patient fit for emergency operation required. It is not to be persisted in, if there is any tenderness. Tenderness signifies interference with blood supply as in strangulation by a band or an internal hernia or intussusception. Obviously operation must be resorted to in these cases as early as the patient's condition will allow. In obstruction to colon also, decompression is only to be used as a preoperative preparation to overcome distension and operation must be done as early as possible.

As regards the quantity of fluids and its rate of administration, an approximate idea can be got by the general condition of the patient whether the tongue is moist or dry, pulse rate, amount of fluid lost in vomiting, quantity of urine passed etc., 5% glucose saline and 5% glucose in distilled water are the ones often used in large quantities. Plasma substitutes like plasmosan, dextraven etc., which are available in the market are also helpful. Blood or plasma transfusions, electrolyte balance etc., have important place in therapy but these cannot be fully discussed here.

(*d*) **Acute Appendicitis and its Complications**—The treatment of this condition may be summarised as follows. It is always best treated by operation except under two circumstances.

(1) Where the patient is so ill with generalized peritonitis that operation if undertaken than, is sure to end fatally, Or

(2) Where the patient when first seen has a lump in right iliac fosa and the condition is beginning to subside. Here, it is better to wait till the inflammation resolves and do an interval appendicectomy.

If while the patient is under observation the lump instead of resolving becomes bigger and an appendicular abscess forms the abscess will have to be drained. Ofcourse sometimes spreading peritonitis may occur without localization. The subject is however too vast to be discussed in all its aspects here. In cases where the patient is seen with generalized peritonitis, as mensioned in (1) above, intravenous drip glucose saline, intestinal decompression and massive doses of antibiotic and chemotherapeutic drugs will help the patient to tide over the crisis. He may completely recover after a stormy convalescence or a localized abscess may form which will have to be drained at the appropriate site and moment. Among the various places where a residual abscess may collect, the "Residual pelvic abscess" is a well known and fairly common one. In this condition the patient has usually an irregular fever, frequent desire to pass motion, but only blood and mucus are passed without relief, and the motion shows no evidence of dysentery. Sometimes there is frequent micturition also. Rectal examination shows a fluctuant swelling in the rectovescial pouch and

there may be a palpable mass in the hypogastric region also, dull on percussion. The swelling is bimanually palpable. Such cases are easily treated with no more instruments than a pair of sinus forceps, a gloved finger, and a soft catheter. The bladder is first emptied to be sure that one is not dealing with a distended bladder. The patient is put in lithotomy position, and with the gloved left index finger in the rectum as a guide, a sinus forceps is thurst into the most pointing fluctuant part of the swelling (Fig. 3) and pus comes out. No anaesthesia is required for the operation. In the majority of these cases, the anal spincter is patulous and a rectal speculum shows the hyperaemic mucous membrane exuding slightly blood stained mucus. As the anal spincter is patulous, the operative procedure described above can easily be done without great discomfort to the patient. When the sinus forceps enters the abscess cavity and pus escapes,the left index finger is guided through the opening made, and a drainage tube or a self-retaining catheter is introduced into the abscess cavity and stitched in place to the anal margin (previously infiltrating the skin with novocaine). The tube is left in place for a week or 10 days, periodically washing out the abscess cavity with saline or any mild antiseptic. The patient is nursed in the Fowler's position and the abscess cavity rapidly closes down. The majority of these patients do remarkably well. I have adopted this method in several cases with very gratifying results.

**Case Report**: Some years ago an European soldier of about 20 years was admitted with generalised peritonitis presumably the result of acute appendicitis. Under Oschner Sherren treatment he was progressing very slowly. One day he became acutely ill, and looked practically moribund. Rectal examination showed an enormous pelvic abscess which had hitherto been overlooked. The abscess was drained by the above method and he rapidly recovered and was discharged cured.

Some at least of the deaths after operation for acute appendicitis are due to following causes which are avoidable :—

(1) Not walling off the abdominal incision with towels before opening into peritoneal cavity and before handling the infected areas.

(2) Not packing off the surrounding peritoneal cavity carefully before the infected appendix, caecal or ileal region is handled.

(3) Not draining the incision in the abdominal wall where it is indicated.

In (1) and (3) spreading cellulitis of the abdominal wall may contribute to a fatal issue. Fortunately, with the advent of antibiotics and chemotherapy such complications are rare nowadays.

(*e*) Where patients are seen during acute abdominal distress, conditions like acute dilatation of the stomach must not be forgotten, for they are capable of easy remedy if undertaken at the proper time. Pass a stomach tube, empty the contents and then leave in a Ryle's tube for continuous suction drainage, keep patient face down with foot of bed elevated and institute intravenous drip infusion.

(*f*) In cases of volvulus of pelvic colon where facilities for operation are not available, or some time is likely to be taken for arrangements, the following method is well worth trying :—

Keep the patient in the knee-elbow position if possible, and with both hands gloved pass a well lubricated stiff flatus or colon tube into the rectum. With two fingers of the left hand shoved as high up in the rectum as possible guide the flatus tube up, pushing it up with the right hand. The left hand fingers in rectum are necessary to prevent the coiling of the flatus tube there, which will otherwise invariably happen. The flatus tube thus guided, passes up the twist in the colon which thereby gets deflated and

the vovulus is thus enabled to untwist itself. This method will particularly succeed if the twist is partial and I have more than once succeeded by adopting this method. Once the flatus tube is passed up, leave it in place, stitched to the anal margin. If the patient is fit for operation, even if the above method succeeds, operation is better done, because recurrence is not unusual. One disadvantage of the above method is, that once it succeeds some patients may refuse operation. Still the method is worthy of application, (*a*) to allay the patient's discomfort until operation is possible; (*b*) in cases where operation is refused, it may be a life saving measure; (*c*) where it succeeds, and if the patient is too ill for operation, to tide him over the crisis and get him fit for operation at a later stage. If deflation occurs, it is better to give a soap and water enema, with the tube in place and the bowel is thereby well emptied.

5. **Rupture Urethra** :—Rupture of bulbous urethra may occur as a result of trauma. This is a serious injury. It can be easily diagnosed by the triad of perineal haematoma, bleeding per urethra and retention of urine. If the bladder is distended, the best thing is to do a suprapubic puncture and introduce a self retaining catheter, using a Kid's or similar type of trocar and cannula. Alternatively, an inch-and-half long incision is made down to the bladder, midway between the umbilicus and symphysis. The patient is put in Trendelenberg position and the peritoneum pushed off from the bladder. Two stay sutures are introduced into the wall of the bladder, a stab incision is made between the sutures, and a self retaining catheter is introduced.

Associated pelvic fracture is strapped up, if possible and materials are available, the pelvis is immobilised in a plaster spica. Further treatment is left to more favourable circumstances and surroundings.



If the bladder is not distended, there may be rupture of bladder (intra – or extra-peritoneal). Details of treatment cannot be gone into here.

### Some Facts of Importance.

The following are illustrative examples of some of the various other emergencies that may arise and are mentioned to point out how one must be prepared to meet with different types of emergencies peculier to different places.

"**Endemic Funiculitis**" :—This is a condition that occasionally arises in areas of endemic filarial infection. The spermatic cord is the seat of acute streptococcal infection and the condition may and often does resemble acute strangulation of the gut with pain, tenderness, swelling and reflex stoppage of bowel action. Indeed, in doubtful cases it is best to open and see to exclude a strangulated hernia. The cord will be found to be acutely inflammed and intensely congested with beads of pus exuding here and there. Previously the only way to save life was to do an orchidectomy, removing the cord well above the inflammed area and leaving the wound wide open, loosely packed with vaseline gauze. In the absence of such treatment, death was usual due to streptococcal septicaemia. Now-a-days penicillin and sulphonamides may help to save life, with or without operation. The point to remember is that when in such endemic areas a doubt arises as to whether in a given case one is dealing with a strangulated hernia or not, it is far better to open and see than assume it to be a case a funiculitis and try the effects of antibiotics and other drugs. If on opening, it is found to be one of funiculitis no great harm is done. The wound can be left open for drainage and drugs administered. If the reverse is done, the result will naturally be a disaster.

**Haematuria As a Rare Complication of Filariasis** :—It is worth pointing out that some at least of the cases of haematuria

in our Country are due to filarial infection. If the urine is centrifugalised and seen, microfilaria may be found in them. It is really a case of chyluria in which the chyle is small in quantity and not obvious, while the associated venous bleeding is proportionately much more and masks the real condition. I have personal knowledge of a few such cases, doing quite well over a long number of years, in whom occasional attacks of chyluria and haematuria occur with long intervals of freedom (Mahadevan, 1941). Investigation in these cases have excluded other more likely causes of haematuria. I happen to know of at least one case where a kidney had been removed for the so-called "Essential Haematuria". The underlying cause was filarisis.

## Conclusion

I hope what has been described above will bring out the great possibilities by which lives can be saved even under adverse circumstances. An emergency kit consisting of the following will be of use under these circumstances :—

1. Regional and local anaesthesia set (requirements already described).

2. Blood transfusion set (requirements already described).

3. Sterile ampoules of normal saline, 5% glucose saline, etc., 530 c.c. capacity or even bigger sizes, smal ampoules of more concentrated solutions like 25% glucose solution, etc.

4. Sterile ordinary and self retaining catheters, Ryle's tube, Levine's tube, big stomach tubes, etc.

5. A few elastoplast bandages, plaster of Paris bandages, a bright torch light etc.

6. Pneumatic tourniquet or broad flat rubber bandages.

7. Tracheostomy.

These are, ofcourse in addition to the usual instruments for surgical emergencies such as small portable sterilisers, etc. and drugs like morphia, amyl nitras, hyalase, penicillin etc.

One of my chiefs used to quote a saying "A faint heart never won a fair lady". May I modify it and say that a "Faint heart" will not succeed in tackling cases of the type outlined here, but with courage, calmness and broad common sense many lives can be saved.

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# LEGEND TO FIGURES

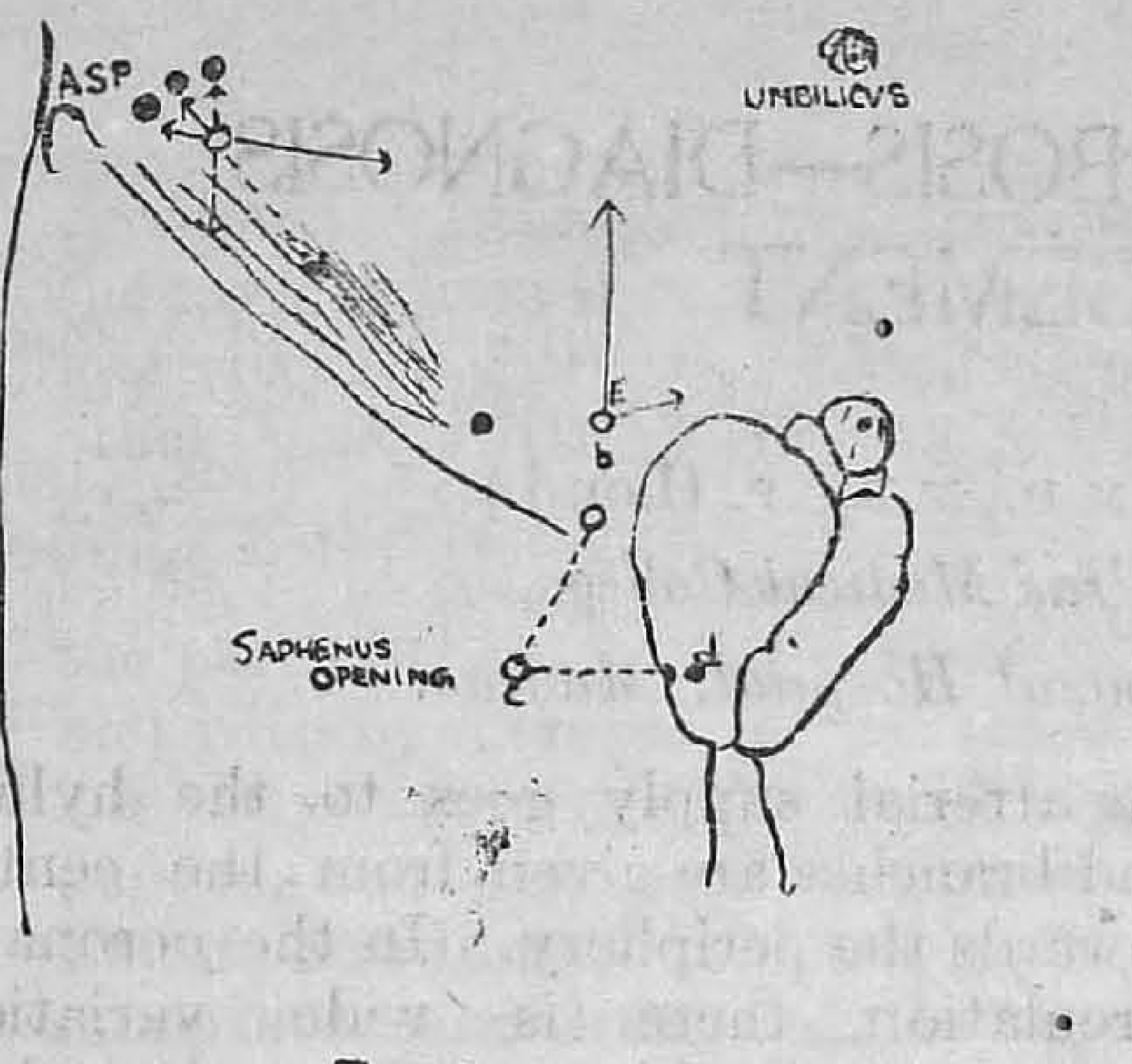


FIG. 1.

**Regional Anaesthesia for Inguinal Hernia Operations**

*a. b. c. – Intradermal Wheals. Thick lines – Circum injection of the subcutaneous tissues connecting the wheals. Dotted lines – injection into the muscular planes. At d the scrotal nerves are blocked. A. S. P. – Ant. Sup. Spine. E-Ext. Abd. ring. (Injection into spermatic cord). I – Ilio-inguinal and Ilio-hypogastric nerves blocked. – (After Ogilvie, modified).*

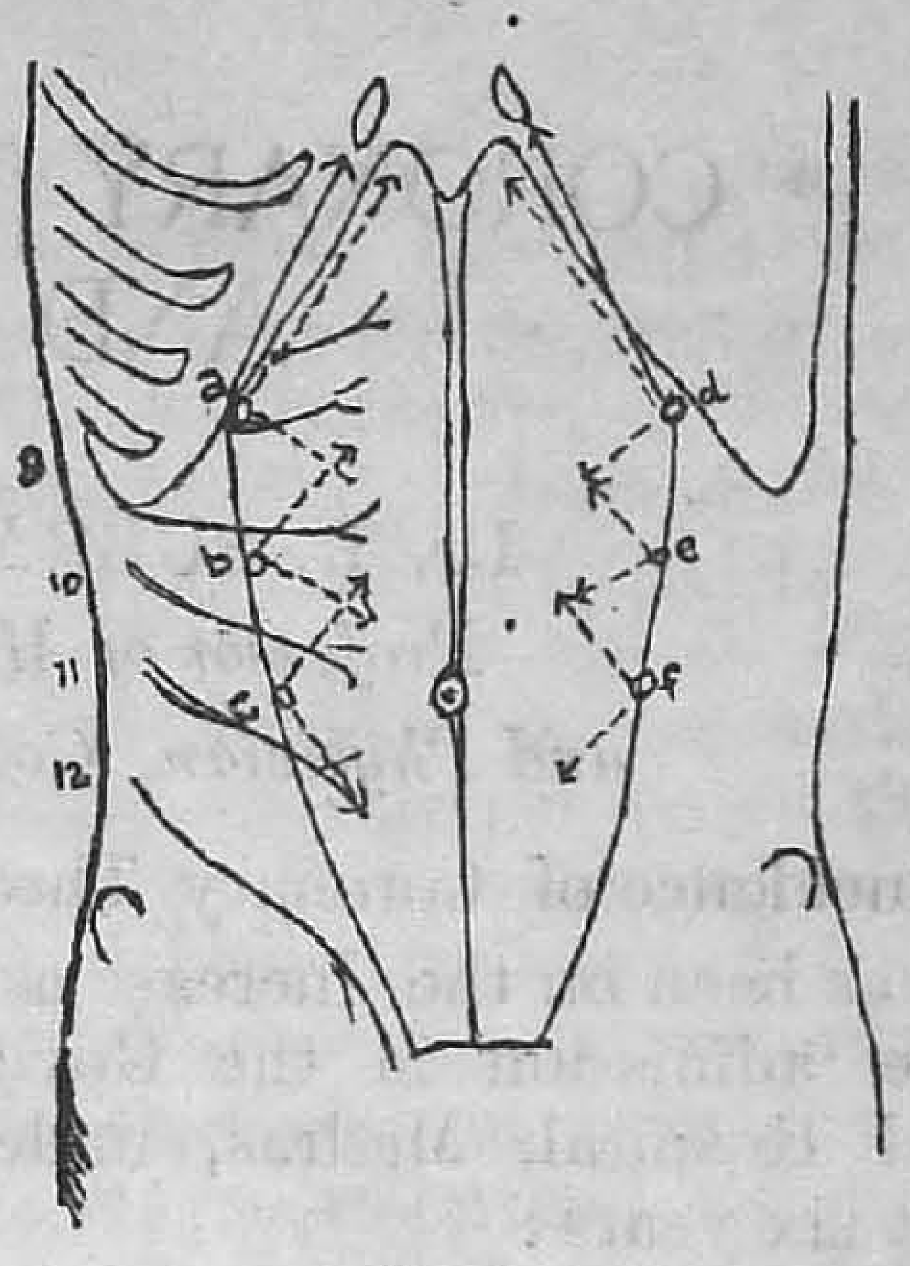

FIG. 2.

**Local and Regional Block for Abdominal Operations**

*a. b. c. – Cutaneous Wheals. Thick lines – Injection into Rectus border. Dotted lines – Injection into muscular planes. – (After Ogilvie, modified).*

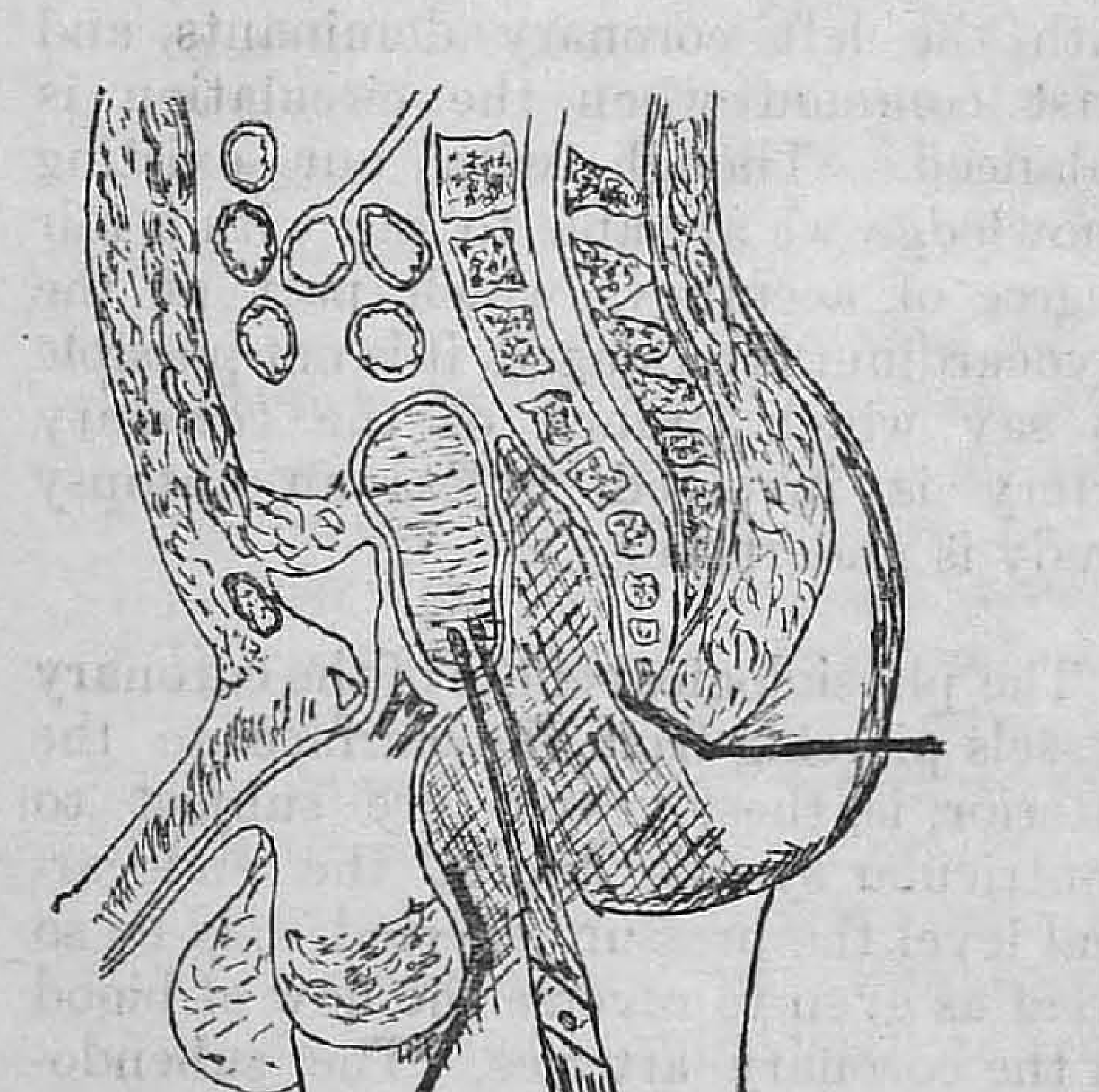

FIG. 3

**Showing the Opening of a Pelvic Abcess into the Rectum**

*The ends of the sinus forceps are shown within the abcess cavity. – (After Hamilton-Bailey).*

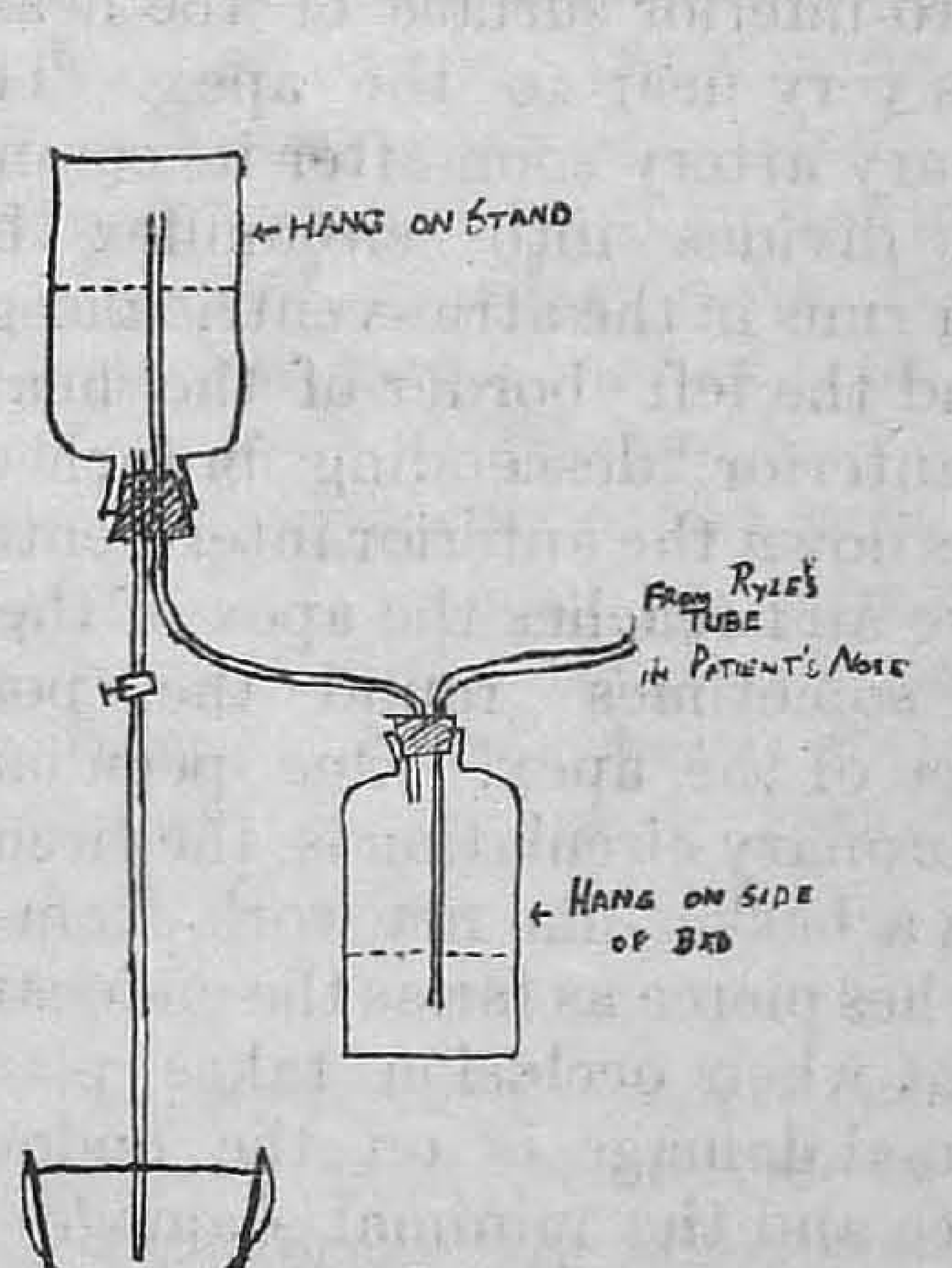


FIG. 4

*The Wangensteen arrangement for continuous suction. (After Hamilton Bailey-Pye's Surgical Handicraft)*

# * CORONARY THROMBOSIS—DIAGNOSIS AND MANAGEMENT

*by*

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THE incidence of Coronary Thrombosis has been on the increase as shown by the admission in the Government General Hospital, Madras, under me in the last six years :

| | | |
|---|---|---|
| 1952 | ... | 18 |
| 1953 | ... | 27 |
| 1954 | ... | 28 |
| 1955 | ... | 20 |
| 1956 | ... | 28 |
| 1957 | ... | 30 |

The coronary arteries emerge from the aorta just above the aortic valve. They lie in the atrio ventricular groove. The right coronary artery pass to the right upper end of the posterior inter-ventricular groove, where it turns down the postero-inferior surface of the heart and comes very near to the apex. The left coronary artery soon after its commencement divides into circumflex branch which runs in the atrio-ventricular groove around the left border of the heart and the anterior descending branch which passes down the anterior inter-ventricular groove and reaches the apex of the heart and sometimes round the posterior surface of the apex. One peculiarity of the coronary circulation is, the circulation forms a basket-like net work from which branches pierce as far as the endocardium, so that when occlusion takes place, the maximal damage is on the endocardial surface and the minimal damage to the myocardium. This arrangement is of vital importance as the myocardium must be spread at all events. A similar arrangement is available for cerebral circulation as well, whereas in the rest of the body the arterial supply goes to the hylum and branches are given from the centre towards the periphery. In the coronary circulation, there is wide variation between one subject and another, but even so, it has been observed in about 50% of subjects the right coronary artery supply the entire right ventricle and the posterior ⅔rds of the ventricular septum. In about 30% of cases the right coronary artery supplies the right ventricle and the posterior half of the ventricular septum, whereas the left supplies the left ventricle and the anterior half of the septum. In rest of the cases which is less common, the left coronary artery is a dominent one. In these the right coronary arteries supply part of the right ventricle, the rest being supplied by the left ventricle. Schlesinger has claimed myocardial infarction is more common with the left coronary dominants and least common when the circulation is balanced. Though with our existing knowledge we are able to say with a fair degree of accuracy, which part of the myocardium is damaged, it is not possible to say which branch of the coronary artery is involved, unless an autopsy study is undertaken.

The physiological effect of the coronary vessels piercing from the surface to the interior, is, these vessels are subject to ventricular systole, and at the endocardial level the pressure exerted may be so great as even to reverse the flow of blood in the coronary arteries. The subendocardial layers of the myocardium are normally ischaemic during systole and the subendocardial infarct is definitely more common. Another physiological

* Lecture delivered at the Indian Medical Association, Salem.

peculiarity of the coronary circulation is the myocardium is capable of extracting more oxygen from the blood than the other muscle tissue in the body, the obvious disadvantage of such a thing being, in increased demand of oxygen on the part of the myocardium can only be met with by increase in the blood flow, and the myocardial work increase depends on increased coronary flow. The myocardium should be supplied with more blood and death of the part will take place if increased oxygen supply cannot be met with. During each systole there is a temporary reversal of blood flow in the left coronary artery due to the force of myocardial contraction. Such a reversal does not take place in the right coronary artery as it is not subjected to that much of pressure and that may be the reason why the majority of the infarction occurs in the left ventricle and the scarcity of infarction in the right. Nerve supply to the coronary vessels does not seem to control the flow of circulation. The flow of supply of the blood in the coronary circulation seems to be controlled by the metabolism of the heart itself. Anoxia causing increase of the coronary blood flow and the mechanism by which this increase is brought about is not known.

Coronary circulation is not ordinarily affected as a result of atheromatous process. Nearly 90% of the occlusion of the lumen is necessary before any effect is felt on the coronary circulation. Where the coronary peripheral pressure is relatively high, a small projection in the lumen does not interfere with the functional efficiency. If however due to increased myocardial work or localized anoxia, peripheral vaso-dilatation were to occur, then a previously insignificant vascular narrowing may as a result of limited blood flow, show failure symptoms or insufficiency may occur, particularly at a time when the myocardium needs increased flow of blood to meet extra oxygen demand.

The sudden death in the coronary thrombosis is due to one or two factors, namely ventricular fibrillation or ventricular standstill. In man the chances of either event occurring is 50 : 50, and so drugs which are likely to cause ventricular excitability like quinidine are as likely to be dangerous as those which increase excitation like digitalis. It has been observed occlusion of the coronary vessels for 20 or 30 minutes will not necessary result in infarction, provided the artery is re-opened within that time. When myocardial infarction occurs, the ischemic area does not infarct homogenously, for areas of surviving muscle remain. If the whole thickness of the ventricular wall became necrotic, then rupture of the ventricle would be inevitable. In fact, a network of living muscle fibres may run through the infarct and although the area may bulge with each systole, rupture of the ventricular wall is a rare event. Even from the very beginning, the amount of collateral circulation begins to increase and doubles in 48 hours and is three to four times the initial level in a week's time, and at the end of a week, instead of a bulge at the site of infarct, a systolic shortening occurs. The slow development of collateral coronary circulation is in striking contrast to that in the femoral and carotid arteries in which collateral circulation occurs in one or two days. An area of infarction in myocardium may survive owing to the capacity of the myocardial muscle to extract a large proportion of the oxygen carried to it by the blood. It has been observed that collateral circulation is almost brought to normal levels at the end of 4 weeks time.

The amount of the collateral circulation is proportional to the degree of narrowing and by exercise, the amount of collateral circulation increases, though clinically, it might be dangerous to give exercise after coronary occlusion, as it is likely to damage the ischaemic myocardium. It is more reasonable to suggest judicious exercise. So even in a subject of angina,

one may be asked to do exercise short of provoking pain. Collateral circulation goes on increasing for the first four weeks, after the coronary artery is occluded and the necrosis may extend from the centre and revascularization grows from the periphery, with the result that the ischaemic muscle is gradually absorbed and finally gets fully revascularised. The changes in the myocardium is reflected in the T-wave changes in the electrocardiograms. The development of new areas of infarction may be recognised by the abolition of persisting R-waves. The improvement in T-wave abnormalities may continue for a much longer period than 4 to 6 weeks, and there may be improvement even for a year after the infarction.

The outstanding clinical feature of coronary thrombosis is the chest pain in the large majority of cases. Though as a rule, the pain is very severe and incapacitating, the pain may be replaced by one of the equivalents, namely restlessness of shock. Where shock is an outstanding manifestation, the patient may not be able to appreciate the presence of pain. Irrespective of site of pain, there is always a dull substernal pain in the case of coronary thrombosis. The common mistakes that occur in the diagnosis of coronary thrombosis is due to the site of pain in coronary thrombosis not being constant in any one area. For instance, pain in the right side of the chest may be mistaken for pleurisy, and pain in the epigastrium may be mistaken for acute abdomen. So while a classical pain is not likely to be missed, the atypical site or atypical manifestation is often missed. Other variations may be, the pain may be very brief and mild in character and the same was relieved to a considerable extent in the belching and passing a large amount of wind with the result both the patient and the practitioner are deluded to believe that it was " wind " or indigestion that was responsible for the brief and mild pain.

In the course of myocardial infarction, it is nothing unusual for cardiac arrhythymia to occur. One of the serious manifestations is ventricular fibrillation and death, and a less serious manifestation is auricular fibrillation. This auricular fibrillation may be paroxysmal or continuous. If the ventricular rate is high, then the already damaged myocardium may not be able to stand this increased strain and symptoms of failure may occur. When the fibrillation is of short duration, it is likely to be mistaken for paroxysmal tachycardia. Paroxysmal tachycardia by itself may also be one of the arrhythmic manifestations of coronary thrombosis. With posterior myocardial infarction, there may occur heart block, either complete or partial heart-block may occur which fortunately is not a common disturbance. Prognosis depends largely in such an attack on the ventricular rate and upon the integrity of the myocardium.

With regard to the picture of shock, it may be the only manifestation of coronary thrombosis and the degree of shock certainly gives the clue with regard to the prognosis. More marked the picture of shock, greater the fall in systolic pressure. A progressive fall in the systolic pressure by itself may mean a bad prognosis. We have had cases in which the pressure has fallen as low as 60 or 70 m.m. Hg. and in cases where recovery did not take place, pressure could not be recorded and ultimately death occurred.

**E. C. G. changes:** Typical E. C. G. changes occur with coronary artery thrombosis. What is characteristic of coronary thrombosis is the varying pattern of the E. C. G. that occurs from day to day. Under normal conditions of health, the E. C. G. is as constant as the finger prints of man, but with the onset of thrombosis, each day we get a different picture till the process is arrested or halted by natural process of healing, or death takes place putting a stop to further changes.

Complications that may arise in the course of coronary thrombosis are pericarditis. Pericarditis generally occurs at the end of the first day, though it may be delayed even as long as 48 or 72 hours. Exceptionally it may occur even as late as beginning of the second week. This however is very unusual. Though it is not an important complication, this complication should be borne in mind as when pericarditis occurs a fresh onset of pain also occurs. The question that arises in the mind of the Clinician is whether there is an extension of previous thrombosis or, a fresh thrombosis is taking place. The onset of pericarditis is characterised by a small elevation of pressure and the patient himself is generally able to distinguish this pain from pain due to myocardial infarction, and when pericarditis is occurring in the anterior surface, a pericardial rub is also heard. With the posterior infarction and posterior pericardial rub, there may be no clinical findings. The site to look for the pericardial rub is over the precardium and along the edges of the heart. The pain is usually localised and does not radiate. Besides there are the characteristic E. C. G. changes in the pericarditis. The point to be borne in mind is the changes due to pericarditis may be masked by the previous myocardial infarction.

Less common complications are embolic complications. This is generally seen after the 4th or 5th day of the infarction. This is due to thrombosis from the endocardial surface getting dislodged and being carried by the systemic circulation. In cases of complete immobilization, peripheral venous thrombosis might occur which getting dislodged is likely to be lodged in the pulmonary circulation resulting in pulmonary arterial embolism. This pulmonary arterial embolism is a late manifestation and is likely to be seen in the severe cases of coronary infarction at the end of second or beginning of third week.

The pulmonary embolism is characterised by rise in temperature unusually 100° to 101° and can be detected by serial X-ray of the chest. The X-ray appearances are like that of rounded shadows of the size of a small marble which very in size from day to day.

**Treatment**: The immediate treatment consists in relieving the pain. It is the unrelieved pain that is responsible for one of the most outstanding clinical features of the disease—namely shock. So to relieve the pain $\frac{1}{4}$ gr. of morphia is given intravenously in severe cases and intramuscularly in moderate cases. When morphia is given intravenously, one of the cardiac analeptics is also given intramuscularly at the same time. The object in giving morphia I. V. in severe cases is to get analgesic drugs to act quickly, so that the pain is relieved as quickly as possible. If given I. M. in serious cases, the circulation is so poor, that the patient may not get relief from pain. Normally the relief from morphia given intravenously lasts for 6 or 8 hours. But when the pain recurs at a shorter interval, there should be no hesitation in repeating the morphia injection even at short intervals of 2 hours. I may emphatically state that morphia is never the cause of death in coronary thrombosis. It is always the unrelieved pain with the attending shock that kills the patient. The amount of morphia that is needed in 24 hours is a very good guide to prognosis. Though the drug may be given every 2 hours, the prognosis is grave. In nearly all cases which have recovered under my care they did not need more than 3 injections in 24 hours and in milder cases, they did not even need 3 injections and some of the very mild cases needed only 1 injection for 24 hours. As morphia is likely to cause vomitting in most people, Pethidine can easily replace morphine. It should be borne in mind even Pethidine is likely to cause vomiting. As soon as pain is relieved, it is a wise thing to hospitalise the patient suffering from coronary

thrombosis. Even in badly shocked cases it is better that they are moved to hospital at an early stage of their illness. The severely shocked cases are best attended to only in hospital, for they need attention round the clock. and more than once I have felt that the case would not have survived, had it not been for the fact that the patient was hospitalized sufficiently early.

As soon as morphia is given, the next thing is to start the patient on oxygen inhalation. Oxygen is best given in the form of a tent, or the next best thing will be to use a B.L.B. mask. . Where even this is not possible, it may be given by a nasal catheter. It is wise to lubricate the catheter with a local anaesthetic agent like nupercain ointment, so that the catheter may be passed well up into nasopharynx. The general principles, namely, warmth, rest and sedation should not be neglected. In conditions of shock or where the pressure is very low, it is a life-saving measure to start the patient on noradrenaline in 5% glucose solution I.V. by drip at the rate of 4 to 8 mcg/minute. I recently had a medical man under my care with a myocardial infarction and his blood pressure could not be recorded on admission. He was in a very severe state of shock. He was treated with Noradrenaline by drip round the clock for 24 hours. From the condition where pressure could not be recorded, the pressure could be recorded as 80/60, and in another 24 hours, it rose up to the level of 120/80. The drip was discontinued at this level, and the patient has completely recovered. Now he is able to walk a distance of 100 to 120 yards without any distress.

In all these bad cases of shock, it is worthwhile to start the patient on anticoagulants. The drug of choice is Heparin, There may be difference of opinion with the use of anticoagulants in the mild cases, but there are no two opinion in the serious cases. Their prognosis has been made considerably better by the use of quick acting anticoagulants like Heparin. Anticoagulants are contra-indicated in patients with peptic ulcer or with advanced liver disease of cerebral haemorrhage. Further they should be under close medical observation while getting anticoagulant drugs, particularly watch for haemorrhage—into skin, urine, stools and sputum, and the action of anticoagulants should be checked frequently by laboratory tests. When anticoagulants are used, the appropriate antidote should be made available. These are Protamine intravenously for Heparin and Vitamin K or K-1 for the Coumerol group.

Where there is urgent need, we use 12,500 to 15,000 units of Heparin on the first day and depending upon the coagulation time of the blood, the dosage is adjusted on the following day. We maintain the coagulation time about 20 minutes seeing that the normal coagulation time is 6 to 8 minutes. At the same time, as the patient is put on heparin, he is also started on Coumerol derivatives, and we use Tromexan (Geigy) or Marcoumar (Roche). These are quick acting derivatives and they are rapidly absorbed on oral administration. Their action is likely to be felt in 18 to 30 hours after oral administration and their action ceases roughly 18 hours after stopping the drug. Though Prothrombin time is only 1½ times the normal level, it doss not necessarily mean that all complications are avoided. In my last two cases where Tromexon was used, one developed haematurin and the other Maleana, though prothrombine time was only twice the normal level. Tromaxon is a comparatively weak agent, the strength being ⅕ of dicoumerol. Marcoumar is 16 times as strong as dicoumerol. So in the order of equivalents Marcoumar 3 mgms, dicoumerol 50 mgms. Tromexan 500 mgms are identical doses.

Prothrombin time should be kept at 30—35 seconds to obtain the best therapeutic results and at this level embolic

complications are avoided. By the timely administration of the anticoagulants, more than once we have been able to save a human life. Conditions under which anticoagulants are likely to exert an intensive action are where there is Vitamin K deficiency or where patient is kept on Salicylates or where he is an alcoholic. If in spite of frequent determination of prothrombine time, i. e., 1½ times the normal level, if any bleeding tendency is to be observed, stop further administration of anticoagulants and administer fresh blood I. V. preferably at least a pint and also give Konakion-Roche both I. V. and orally.

**Rest**: Patients with myocardial infarction however mild the infarction may be is recommended 6 weeks rest in bed and proportionately longer periods for more severe cases. Though shorter periods are permissible for milder cases, I am of opinion that our patients are totally unsuitable for early ambulance. Certainly relaxation from strict bed rest by the use of commode is necessary in elderly persons who are unable to pass urine or motion. A man who has passed 60 or 65, who so far has not fallen ill, if suddenly called upon to pass motion lying in bed is not likely to learn the new lession at this phase of his life. It is much better to release him from bed and allow him to sit on a commode next to the bed.

A useful adjunct in the treatment of coronary thrombosis is Papaverine. It is a very useful drug to control peripheral vascular spasm and is given in a dose of 0·1 gm. intramuscularly for 10—12 days. Another drug which I have found very useful is administration of Aminophyllin I. V. for some days. This also exerts vasodilating effect on the collateral anastomosis, but there may be sensitiveness on the part of the patients and so it is best given I. M. 1 c. c. If no adverse effect is noticed, it may be given I. V. The slow convalescence is of great value though there may be the fear of cardiac neurosis in keeping the patient in bed too long.

**Diet**: During the acute phase of illness, the ideal diet is to starve the patient so that the gastric distension is reduced to the minimum. The patient is asked to be put on glucose or orange or tomato juice. At the end of 48 hours he may be given citrated milk or skimmed milk or defatted butter milk, with small amounts of conjees added to it. 4 or 5 days later he may be given semi-solid food, and after another week solid food may be allowed, if the convalescence upto that stage is satisfactory. It is advantageous to put the patient on a digestive enzyme to cut down flatulence. It is also advantageous to start him on a small dose of liquid paraffin at bed time. Sleep may be ensured by the use of Phenobarbitone or Paraldehyde.

## Summary


1. Pain is the usual manifestation of Coronary Thrombosis though it may be replaced by equivalents like shock, dyspnoea and restlessness.
2. Electrocardiograph is of great value in diagnosis, while a single E. C. G. is not of great value and serial E. C. G. shows a changing pattern.
3. Treatment by rest, morphia or Pethedine, oxygen inhalation and anticoagulants in serious cases.
4. Patients in this country are ill-suited for early ambulance, as they are likely to exert unduly in spite of medical restrictions.
5. A note of optimism is called for in the treatment of coronary thrombosis, as from, early treatment, rest and proper care, more and more cases recover and go through life leading many years of useful activity.


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# ANTENATAL CARE

*by*

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ANTENATEAL care, prenatal care and antepartal care are all terms used to describe the care of a woman during pregnancy. The subject of antenatal care has been receiving increasing attention in recent years and it has become an important advance in Obstetrics. The history of the evolution of antenatal care forms a fascinating chapter in Obstetrics. As early as 1540, Thomas Raynold in his book, 'Birth of Mankind' had given one chapter on the ailments of pregnancy. William Smellie in 1774 wrote 2 chapters on "diseases incident to pregnant women". But it was Thomas Bull who in 1837 first wrote a book solely devoted to Antenatal care "Hints to mothers for the management of health during the period of pregnancy and the lying in period". It was in France and in 1892, that the first shelter was established for abandoned pregnant women, on the initiative of Mme. Becquet of Vienne. On a study of these women, Pinard was impressed with the importance of antenatal supervision in the prevention of eclampsia, malpresentations and accidents in labour. In 1899, a similar institution was opened in a building adjacent to the Royal Maternity Hospital, Edinburgh, called the Lauriston Prematernity Home which admitted pregnant unmarried girls. Started by Haig Ferguson, it was soon handed over to Ballantyne. But as yet, there was no attempt made for routine supervision of all pregnant women. Ballantyne felt the extreme need for a hospital where pregnant women could be admitted and scientifically investigated, and he wrote a paper "A plea for a pre-maternity hospital". This resulted in the establishment of a bed called Hamilton Bed in Edinburgh Royal Maternity and Simpson Memorial Hospital for the study of the Physiology and Pathology of pregnancy and of Antenatal therapeutics from an endowment by Dr. Freeland Barbour of £ 1000. The number of beds gradually increased to 25. This was the beginning of the establishment of antenatal wards, which is now such a prominent feature in all Maternity Hospitals.

The idea of the establishment of the out-patient antenatal clinic started in the United States where in 1901 members of the Nursing Association paid periodical visits to the out-patient department of the Boston Lying in Hospital and they advised pregnant women. But it was in 1909 that Mrs. William Lowel Putnam started the experiment of intensive prenatal care for all patients who had registered for confinement in the Boston Lying in Hospital, nurses visiting these patients in their houses once in 10 days and giving them advices, assurances and encouragement. This had such a marvellous effect that in 1911 the A. N. clinic was opened in the Boston Lying in Hospital. But the first A. N. clinic perhaps in the whole world was opened in 1910 in Australia by Dr. Wilson of Adelaide who got the inspiration from Ballantyne. Ballantyne started the home visit by trained nurses in 1913 and in 1915 opened the first A. N. Clinic in the Royal Maternity Hospital, Edinburgh.

In India, the maternity and child welfare work began in about 1866, the training of the personnel for this in 1918 and the courses of training established in 1933.

Modern Antenatal care is a challenge to preventive medicine and is capable of producing such marvellous results seldom equalled in any other branch of medicine. The old saying that prevention is better than cure is nowhere better exemplified than in the field of Obstetrics. The three obstetric mortalities, viz. maternal mortality, stillbirth and neonatal mortality, are the yardsticks to measure a nation's progress. By an efficient maternity service, in which antenatal care plays perhaps the most important part, these mortalities can be greatly reduced. In 1938 a special committee appointed to report on the maternity and child welfare work in India pointed out that the maternal mortality in India is about 20 per 1000 live births and annually about 20,000 mothers die as a result of child birth and about 4 million disabled due to it. On further investigation in 1942, it was found that about 46 percent of the maternal deaths were due to avoidable factors, viz. 15 percent due to lack of A.N. care, 19 percent due to errors in judgement during deliveries, 4 percent due to lack of facilities and 8 percent due to neglect on the part of the patient or her friends.

An efficient Maternity and Child welfare service is essential for any progressive nation for in the ultimate analysis the destiny of a nation lies in its cradles and it is the pregnant women and the unborn child that form the bricks with which the superstructure of national health has to be built up. The importance of the A.N. care has been so much realised that in some of the western countries, pregnancy is made a notifiable condition-so that every pregnant woman could be brought under supervision. In an ideal welfare State all pregnant women should be looked after by the State from the beginning of pregnancy, throughout pregnancy, labour and in the immediate post-natal period and all modern facilities for investigation and treatment including specialist's supervision should be provided for all. But this is only an ideal to be aimed at, but very difficult to attain especially in a poor country like ours. However compared to other States, Madras stands on a higher level in the maternity and child-welfare work and Bhore Committee paid a glowing tribute to it in its report. The maternity and child welfare centres in the State have become so popular with the people that there is an increasing demand for opening more. Several centres have been opened with voluntary aid. Besides, there are now several Primary Health Centres in all important places. In the Five Year Plan, the State has planned for the establishment of 600 more maternity and child welfare centres at the rate of 120 per year.

Next, we will consider the objects of A. N. care. In the first place it should promote and maintain a normal health of the body and mind of the pregnant woman. A high standard of mental and bodily fitness is to be aimed at. Ballantyne calls pregnancy the Marathan Race of the woman's reproductive process. It is a strenuous time in the woman's life and needs special attention and care. Each case has to be taken as an individual problem for each presents enviornmental, socio-economic and emotional conditions which differ from the other. The psychological and emotional aspects of the patient have to be paid the greatest attention, for ultimately it is this that will make or mar the good effects of A. N. care. It is of paramount importance to evaluate the emotional status of the patient as early in pregnancy as possible and every effort should be made to establish an emotional stabilisation, since emotional instability can affect the health of both mother and child by initiating faulty nutrition in both. The vast majority of cases of hyperemesis gravidarum are of a psychoneurotic origin, often an attempt on the part of the unconscious mind to get rid of the embryo. There may be marital unhappiness or domestic worries etc. In

these cases, isolation of patient from family surroundings and suggestive lines of treatment often cure them in a few days. The nutritional status of the woman at the beginning of pregnancy has been neglected for long. This is an important aspect as it is this, that will determine the individual's ability to undertake the hazards of pregnancy. Previously existing allergies are usually exaggerated during early pregnancy and many allergies are emotional in origin.

The second object of A. N. care, is to remove the fear complex of pregnancy and labour, to gain the patient's confidence and assure her from time to time that everything is going on well. It must be impressed in her miud that pregnancy and childbirth are normal physiological processes and she must be proud to be pregnant and not to be depressed and retract from Society. Herein comes the personality of the medical attendant. If a puny sickly Doctor or Midwife attends on a hefty woman, she will have her own doubts about her skill and whether she will be able to conduct her delivery with safety to herself and her child. One must be kind and sympathetic, at the same time have a firm control over her. Whether you practice hallopathy, homeopathy or "integrated pathy", unless you have sympathy, you cannot be a successful doctor. She must be convinced that you are taking genuine interest in her case and will do everything for her and her child's safety. The care and thoroughness with which her case is investigated will arouse in her confidence in the doctor. Sometimes her doubts and questions may appear silly but never laugh at these or turn down lightly for these might have been a source of worry to her for some time. You must explain to her that there is no need to worry over these. Remember that the patient is watching all your behaviour and is consciously or unconsciously judging, from these. the skill with which you will conduct her delivery. A primi gravida might have heard either from her friends or relatives about their bad experiences or read from books of difficult deliveries. A multi might have had great difficulties in her previous labours. In all these cases, it is the duty of the medical attendent to gain the patient's confidence, to instil confidence in her mind and to cheer her up and to assure her that everything will be all right this time. Once you gain her confidence, more than half the battle is won. Tell her before doing any examination what you are going to do and its significance, and she will readily submit to it. A primi gravida is likely to be very apprehensive, and under nervous tension for she has never experienced pregnancy or labour before. The care of the emotions in the A. N. period will have a most salutary influence not only upon the woman but also on the nature of her labour. The onset of labour will be greeted with enthusiasm as she had been given the pride and knowledge of her own ability and she is sure of your help, if required and she will herself try her best to pass the test of her womanhood with flying colours.

The third object of A. N. care is to assist the patient by educational and other means to prepare herself and her home for confinement and arouse in her an interest in the care of her child. Short talks on general health in pregnancy, how the child grows inside, preparation for confinement, etc. must be given to her. You will have to fight against the ignorance and superstition of the patient and her relatives.

In the last month of pregnancy, you must explain to her, preferably by a diagram, how her child is growing inside her uterus, the signs of the onset of labour, what happens in the first and second stages of labour, the sensations she will experience in these stages and how she must react to them. If she is not told about the normal, she is likely

to mistake most of the normal occurrences as abnormal particularly a primi and will be much disturbed and under great tension. A tense woman will have a tense cervix and prolonged difficult labour. The F.T.P. Syndrome (i. e. fear tension pain syndrome) is well known. In order to avoid pain, eliminate fear and overcome physical tension, in several antenal clinics, the pregnant women are taught the art of physical relaxation and importance of deep and controlled respiration, which is the chief requisite for a painless child birth, and which she must put in practice in the first stage of labour. You must impress on her that it is essential that she must lie calm and relaxed in the first stage of labour, because the mouth of the womb is not opened and unless it is fully opened, delivery will not occur and her straining is only going to exhaust her and predispose to a genital prolapse, and that she must conserve all her energy in the first Stage, while in the second stage, when the bearing down pain comes, she must co-operate with nature and bear down well.

The other objects of A. N. care are too well known that they do not require much elaboration, viz. (1) The early detection and treatment of complications and abnormalities in pregnancy such as hyperemesis gravidarum, pre-eclampsia, diseases of heart, lungs and kidneys, haemorrhages, contracted pelvis, cepahlopelvic disproportion and malpresentations. (2) To preserve the pregnancy to term. In case where there has been history of abortions, intrauterine deaths or premature labour before, proper investigations and treatment are to be undertaken so that the pregnancy is allowed to go to term. (3) To ensure the normal delivery at term of an healthy, uninjured child which in the majority of cases could be effected if her general health is brought up to the maximum efficiency and if malpresentations are corrected and the passages bony as well as soft, investigated and ensured normal. (4) To procure a normal lying in period free from puerperal sepsis and other complications and to enable her to nurse her child properly and return to her usual avocations without any disability. Puerperal sepsis is usually a preventible condition and much can be done to prevent it by an efficient A. N. care, raising the general resistance of the patient and removing all focal sepsis and investigating and treating all vaginal discharges etc.

In the ultimate analysis, the good effects of an A. N. care will be an increase in the number of normal pregnancies, deliveries and puerperium and a reduction in the maternal and foetal mortality and morbidity.

About A. N. supervision, it is often thought that it is necessary only in the latter half of pregnancy. But it is equally important in the early weeks of pregnancy also. First of all, examination of the woman including P. V. is necessary to establish a diagnosis of pregnancy and for the detection of complications like Ectopic pregnancy, Retroverted Gravid uterus, ovarian tumours or fibroids with pregnancy and diseases like heart disease, pulmonary tuberculosis, chronic nephritis and syphilis complicating pregnancy. Secondly routine V. D. R. L. test done in all pregnant women attending the A. N. O. P. have shown that about 6 per cent of gravida with no previous history or clinical manifestations of syphilis gave a positive reaction and by early treatment of these cases with Penicillin, complete protection could be given to the child. Lastly, it is essential to give several advices to a pregnant woman, particularly a primi gravida in the early weeks.

In the examination of a pregnant woman, first obtain the name, age, period of amenorrhoea and any other complaints she has. Then in a primi gravida, her childhood history and menstrual history,

the former to see whether she had any rickets, subacute rheumatism or infantile paralysis and the latter to know whether she is a subject of endocrine disturbance. In a multi gravida, the history of her previous pregnancies, deliveries and puerperium are important. Any obvious deformities such as kyphosis, scoliosis, as also short stature, waddling gait pendulous abdomen etc. should be noted. A thorough systematic examination should then be made. A pregnant woman should not be considered as a mere ambulant pelvis. She has got all the other systems and organs and she is liable to all the affections as her non-gravid sister. Vaginal discharge is present normally in pregnant women especially after the third month. It resembles condensed milk in colour and consistency, and it is not seen on merely separating the labia, but only on inserting the finger in the posterior fornix and depressing the posterior vaginal wall. If the discharge is so profuse as to be evident on mere separation of labia and especially if the vulva appears red and inflammed, or pruritus is present, it is probably abnormal and should be investigated and promptly treated.

Weight of the patient should be recorded. Excessive gain in weight is undesirable. As a rule, it should not be more than 20 lbs. in the last months of pregnancy. A sudden abnormal increase in weight may be the earliest sign of commencing pre-eclamptic toxaemia. Next BP. should be recorded and examined for albumin urine and blood to be taken for V. D. R. L. test. Hl. % should be noted to detect and treat early cases of anaemia. In cases of previous late abortions, intrauterine death of the foetus, still births or jaundice in the new born, Rh grouping of blood should also be done. And if she is found Rh negative, the husband's blood is to be tested and if he is Rh positive there is a possibility of having erythroblastotic baby. To detect this, her blood should be tested for Rh antibodies about the third month and then the 34th week. In the latter half of pregnancy, the presentation and position of the foetus should be noted. External pelvimetry is of limited value for even if the measurements are smaller than normal, if the foetal head is small, it can pass through the pelvis. On the other hand, even if the measurements are normal, if the foetal head is large, it may not pass through the pelvis. So what is more important is to see whether that foetal head can pass through that pelvis or whether there is cephalopelvic disproportion. Outlet measurements are more important, as inlet disproportion is more obvious. A thorough pelvic exploration should be made at the end of 37th week in all primis and in multis with previous bad obstetric histories. In suspected cases of disproportion, Xray pelvimetry is most valuable.

A pregnant woman should be given advices regarding various matters :—
1. It is most important that she must regularly attend the A. N. clinic, once a month till 32 week, once a fortnight from 32nd to 36th week and once a week from 36th to 40th week. At these times, especially after 32nd week, if there is a malpresentation like shoulder, an external version should be done, and she should be asked to report every week to see if this has received. In between these, if at any time there is any bleeding p.v., headache, dimness of vision, epigastric pain, reduction in the quantity of urine, oedema, pain in abdomen, persistent vomiting, chills and fever or sudden escape of fluid from the vagina, she should immediately consult the Obstetrician. 2. Diet. Diet requirements in pregnancy recommended by the Food and Nutrition Board, National Research Council (U. S. A.) is as follows :

Calories 2500, proteins 85 grams,

Calcium 1·5 G., Iron × 15 mgms, Vitamin A -6000 I.U.,

Ascorbic acid–100 mgms, Thiamine 1·8 mgms.

Riboflavine 2·5 mgms. Nicotine acid 18 mgms.

Vitamin D 400 to 800 I. U.

During pregnancy, the mother has to provide for the growing foetus which lives like parasite and draws all its requirements from her irrespective of her condition. So if her diet is deficient, especially in the last trimester, particularly if her nutritional status at the beginning of pregnancy was poor, she or her foetus or both may suffer in various ways. The most important item of the diet is protein. Its daily requirements in 85 grams, i.e. 25 grams more than the non-gravid woman. This is necessary as a pregnant woman stores from 200 to 400 grams of nitrogen equivalent to 1250 to 2500 grams of protein. This is for the growth of the foetus placenta, membranes, uterus, breasts and for providing a reserve for loss in parturition, puerperium and lactation. At least half the protein, according to Eastman $\frac{3}{4}$ should be animal protein of high biological value, such as meat, milk, eggs. The optimum requirements of carbohydrates and fats are not known, but they are rarely deficient in a mixed diet. The chief value of fat is as a vehicle for vitamins A and D.

Minerals like calcium and iron are essential. Foetus at term contains about 30 grams of calcium and the foetal liver contains about 5 times of iron in adult liver and these are stored especially in the last 2 or 3 months. Mellanby advises a daily intake of 1 mgm of iodine which can be obtained by taking sea fish twice a week. According to him if iodine is deficient in repeated pregnancies, it is likely to cause goitre in the foetus as well as in the mother.

Vitamins A, $B_1$, Riboflavin, Nicotinic acid, C and D are essential. Vitamin A for the maintenance of the body resistance and to prevent intercurrent infections, like pneumonia pyelitis and infection in labour and puerperium. Milk fresh green vegetables and butter are good sources of this. Vitamin $B_1$ deficiency may predispose to polyneuritis, toxaemias, constipation, pyelitis, uterine inertia and P.P.H., also retinal haemorrhages and Wernicke's encephalopathy which occasionally develop in severe (cases of hyperemesis) gravidarum are ascribed to its deficiency. Riboflavin deficiency may cause heart burn, Stomatis, glossitis etc., in pregnant women and congenital deformities in foetus. Vitamin B complex source-milk, eggs, liver, green vegetables Vitamin C seems to be necessary for the proper development of the foetus. Citrus fruits and tomatoes are rich in these. Vitamin B controls the absorption and utilisation of calcium. It can be obtained from milk, eggs, fresh green vegetables and cod liver oil.

It must be understood that diet in pregnancy need not be either more or less than that to which the woman has been accustomed, unless the gain in weight is excessive. Increase in weight should be limited to about 20 lbs. Dieckmann limits to 18 lbs. and he employs a 1800 calories diet with the aid of dieticians. Ordinarily, if the patient has been taking a well balanced varieties of foods including milk, meat, eggs, green vegetables and fruits there is no need for any change. According to Mellanby the diet of the pregnant woman should contain a daily intake of 2 pints of milk, one or two eggs, one or two servings of green vegetable like cabbage or spinach, an orange or apple, cod liver oil, two tea spoons, sea fish twice a week and calf's liver once a week, with additional food that the woman likes to make up the total calorie needs.

3. Exercise. Regular exercise in the open air is important for pregnant woman. It promotes sleep, helps digestion, tones up the muscles and encourages

a cheerful frame of mind. For the most part ordinary household work is enough. In addition one or two hours are to be daily spent in the open air. Any exertion should stop short of fatigue. Violent exercises like, cycling and swimming should be avoided during the last 6 months.

4. Sleep. At least about 8 hours in a well ventilated room.

5. Rest. 2 to 3 hours every afternoon.

6. Clothing will depend upon the climate and the season. It should be warm enough to guard against chills and sufficiently loose to allow free movements of the limbs and free breathing and should not tightly compress the abdomen or breast.

7. Care of the breast: From about the 6th month, the nipples should be washed daily with soap and warm water to get rid of the crusts of dried secretion on them. If they are flat, they should be drawn out by the finger and thumb for a short time each day using a little lanoline as a lubricant. If this is not done, the new born baby will not be able to suck at the breast and this will lead to its wasting and ill health and in the mother engorgement of the breast, mastitis and breast abscess. If the breasts are heavy and pendulous, they may be supported by an uplifting type of brassieres.

8. Bowels: Bowels should be kept regular during the whole of pregnancy. If a well balanced diet is taken, with sufficient fluid and roughage and daily exercise, normal evacuation of the bowel will usually occur. If it does not, some laxatives like prune juice, milk of magnesia or liquid paraffin may be used.

9. Bath: A daily warm bath is essential, and special attention should be paid to clean the vulvo-perineal region. Shower bath or ordinary splash bath are preferable to tub bath for fear of infection in the latter.

10. Attention should be paid to teeth and gums. Regular cleaning of teeth and gums in the morning and night should be enjoined. If there is carious tooth or pyorrhoea, it must be promptly treated, lest it should be a source of infection.

11. Travelling: travelling is fairly safe in the first half of pregnancy, but in the second half, it should be restricted as much as possible especially at the times corresponding to the suppressed menstrual periods.

12. Sexual intercourse: Usually does no harm in healthy pregnant women at least upto 36th week. Even in the last month, it is less dangerous than was formerly feared, but where there is a tendency for abortion, it should be prohibited throughout pregnancy.

13. Factory workers and those engaged in hardwork should get leave for the last 6 weeks for more rest and out door exercises.

14. Personal Hygiene: Pregnant women must be clean in dress, habits etc.

15. Mental Hygiene: Pregnant women should maintain an equable temperament and should avoid all mental excitement.

Finally, it must be borne in mind, that A. N. care is only a means to an end, the end being a safe delivery. Efficient A. N. care will go a long way to ensure this. But antenatal methods are only the strategy, while intranatal methods are the tactics of obstetrics. Both are equally important. An efficient. A. N. care should be followed by an efficient intranatal and postnatal care, if the best results are to be achieved.

# CASE NOTES

## ACUTE INFECTIVE HEAPTITIS

*by*

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THE following is the personal experience of a doctor who suffered from acute infective hepatitis for eight weeks.

Age 47. Hindu. Vegetarian. Non-smoker Antialcoholist. Profession :- Medical Practitioner in a poor locality.

Source of infection :-His hospital.

The patient, in the last week of December 1957, noticed a sense of lethargy for work, weakness even on slight exertion and fever in the evenings. These troubles did not make the patient change his daily routine such as hot water baths in the mornings and evenings, lactovegetarian diet and professional work.

The fever, weakness, loss of appetite especially to milk and fats increased, urine gradually became high coloured and later on, deep yellow. Stools gradually lost the yellow colour, and by the 7th of January 1958, became white and small in quantity. Skin became pale first and by 12th January, almost lemon coloured. Intense itching was noticed from the day the stools became white. The rise of temperature was only in the evenings and never went above 100 degrees F. Due to the fever, the evening baths had to be omitted. The patient was able to look to his professional work, though with a little strain.

The fever remained for 15 days. Later on, there was a feeling of heat ; but the thermometer never recorded a rise in temperature. Another important feature noticed was that the patient felt he had a large tongue in a small mouth. The tongue was normal except for a yellowish brown coating.

There was a feeling of fullness in the abdomen, and vague pain in the liver area. Liver was tender and enlarged four fingers. Spleen was normal.

Laboratory tests :—Only urine was tested. Urine showed bile and bile pigments.

Treatment :—Diet. A special liking for carbohydrates was noticed. Large quantities of rice conjee with lime pickle were drunk with relish. Tea and coffee were disagreeable. Drinks made up of lime, oranges and grapefruits and tomatoes were very much liked.

Drugs :—For seven days, no medicine was taken. When the fever persisted, the standard Soda Salicylas Mixture with Hexamina and dextrose was taken with no appreciable change. The medicine was used from Jan. 1st to Jan. 7th. Distaquaine tablets one three times a day for four days brought the temperature to normal.

For the jaundice, as per the advice of the attending doctor, Felamine (Sandoz) one tablet, three times a day was taken for a week, from 7—1—'58. Bowels remained constipated, but the stools changed to golden yellow colour on Jan 15th. Tenderness in the liver, fullness of the abdomen and loss of appetite to fats and proteins remained, Urine was still yellow. Eyes deep yellow.

On the suggestion of the family, a herb called Keezhanalli was started on the 16th morning. The preparation of this medicine is simple. The whole plant is ground and made into a paste. The paste, the size of an average gooseberry,

is mixed in pure unboiled cow's milk and drunk in empty stomach. The diet restriction was not severe. Except slight reduction in salt and abstinance from condiments, a normal vegetarian diet was eaten. There was no medicine for the rest of the day.

The following is taken from the Materia Madica by Nadkarni on Keezhanalli (Tamil and Malayalam), Bhuin–anavalah (Hindi), Phyllanthus Niruri (Latin) or Bhahupathra or Bhutha–Thatri (Sanskrit).

"................Common in Central and South India. Considered deobstruent, diuretic, astringent and cooling. A decoction of the plant is administered in jaundice. Or half-ounce rubbed in a cup of milk is given morning and evening or root or dried bitter leaves in powder are used in teaspoonful doses. Whole plant is used also in some cases of dropsy, gonorrhoea, menorrhagia and other genito-urinary affections... Young tender shoots are administered in the form of infusion for chronic dysentry. Juice of the stem mixed in oil is used in opthalmia. Whole plant pounded with its root and combined with rice water is used in poultice for ulcers, sores itch and skin affections. A bitter essential substance called Phyllanthin has been isolated as a stomachic bitter and is used in dyspepsia. Plant is used in diabetes."

On the second day after taking the herb, abdominal fullness became less, motions became loose and bulky and urine less coloured. Stools became normal in colour also. A sense of well being set in. The urine became completely normal on the 1st of February. The herb was stopped on that day. The colour of the eyes became normal in the last week of February.

Conclusion :—The intention of this case note is 1. To point out the strange phenomena. viz, the feeling of heat in the absence of fever. and also of a large tongue in the mouth. These symptoms are not described in text books. 2. To request the readers and research workers to take an interest in the herb mentioned above.

I am grateful to Sri D. R. S. Rauther, M.Sc., for giving me particulars about Phyllanthus niruri and also to Dr. M. Ikram, M.B.B.S., for the help given.

* * *

### Oxygen Therapy

The administration of oxygen though a common enough procedure seen in the wards should yet be based on scientific principles. Oxygen is indicated in conditions inducing anoxia.

Anoxia in turn is classified into four varieties :

(1) Anoxic anoxia.

(2) Anaemic anoxia.

(3) Stagnant anoxia.

(4) Histotoxic anoxia.

Anoxic anoxia occurs when the alveolar membrane is not supplied with the proper percentage of oxygen. This is found to be the case in the rarefied atmosphere of high altitudes and diseases of the lungs, bronchi, trachea etc.

Anaemic anoxia occurs when the active haemoglobin content of the blood is reduced, such as occurs in anaemia, carbon monoxide poisoning etc.

Stagnant anoxia is due to a slowing down of the blood stream thereby delaying oxygenation. This is well seen in congestive cardiac failure.

Histotoxic anoxia is brought about by the interference in the cellular enzyme systems so that they are unable to use the oxygen reaching them. This is best illustrated in cyanide poisoning.

The inter relation between anoxia and cyanosis is interesting and important too It has been proved that cyanosis is. a manifestation of accumulation of reduced haemoglobin. The critical value of 5 Gms. per haemoglobin should be reached before cyanosis becomes noticeable. In anaemic states due to the lessened quantity of haemoglobin, oxygenation is usually complete and hence cyanosis does not occur. Only in anoxic and stagnant anoxias does cyanosis occur. It is only in these two varieties that oxygen therapy is of use and not in anaemic anoxia where measures to increase haemoglobin will be much more useful.

Hence the chief indications for oxygen administration are:

(1) Respiratory diseases like pneumonias, asthma, collapse lungs etc.

(2) Cardiovascular diseases: Acute and congestive cardiac failures, coronary occlusion, angina pectoris etc.

(3) Following cardiac and pulmonary surgery.

(4) For premature infants.

(5) Anaesthesia.

The methods of administration of oxygen also very according to usage and need. The following are commonly used:

(1) Intranasal catheter.

(2) Intragastric catheter.

(3) Mask.

(4) Oxygen tent.

The first is the one commonly seen in the wards. An anaesthetic lubricant will render the catheter less unpleasant to the patient. To be of use the catheter should be pushed up high. The intragastric method is particularly useful for infants whose lungs are diseased. The mask method is very suitable for ambulant cases and for persons like aviators and mountain climbers. The B. L. B. mask is well known. The tent made of impervious plastic is a boon to the patient following a thoracic operation.

Over-enthusiastic oxygen administration should receive a check with the advent of the knowledge that Retrolental fibroplasia of the hyaline membrane of the premature infant is caused by excessive oxygen therapy. Oxygen poisoning occurring due to dry oxygen irritating the lungs should be guarded against. Pseudo-oxygen poisoning like that occurring in asthmatics and emphysematous patients can be avoided by intermittent administration of oxygen and preventing carbon dioxide accumulation. In Asthmatics and Emphesematous patients their respiratory centre gets sluggish to carbondioxide excess which is the normal mechanism, since there is always accumulation of this element in the lax alveoli. Such patients if given continuous Oxygen go into Coma which is really a Carbondioxide narcosis. The fact being that these unfortunate individuals are tuned in their Respiratory centre to Oxygen lack and excess oxygen puts out of gear this safety mechanism which they have developed. Thus such cases should get only INTERMITTENT OXYGEN.

* * *

**Cancer Breast in a Male.**

Patient T., male aged 40 years was admitted on 6—11—56 with a lump in the right breast of one year duration. This had started as a small nodule in the right breast and had been progressively growing in size. It had become painful during the last six months. Six months ago at a Taluk Hospital the lump was aspirated with a needle. The patient had been otherwise living a normal healthy life and did not give any history of any cough, fever or any infectious disease.

On examination, he was a well nourished man, not anaemic or jaundiced with a normal skin and a normal temperature. There was no oedma anywhere or any clubbing of the fingers.

There was a lump about the size of a small unpealed cocoanut in the right breast extending to all its quadrants. The skin was stretched and shiny with dilated veins. The right nipple was at a lower level than the left, but there was no retraction of the nipple. Peau d'orange appearance was present to a radius of two inches all round the nipple. The surface of the lump was lobulated, warm and tender. There were three localised fluctuant swellings incorporated in the lump in its lower inner, upper inner and upper outer quadrants. About I inch below the nipple there was a smaller swelling with a stretched skin over it and a tendency to burst. According to the patient this was the site of previous puncture. The lump was freely movable in all directions, but the mobility was kept tense. There were three glands felt in the axilla, firm, not tender, not adherent to the skin, and freely movable. There was no serous or bloody discharge from the right nipple on squeezing.

*Laboratory investigations :*

Blood haemoglobin—10·5 grm.

B. P.—130/90,

Total W.B.C. count—10,000/- c.m.m.

Diff. count–Polymorphs 60% Lymphocytes 36% Eosinophiles 4% Urine and motion normal.

X-ray of the chest showed definitely increased lung markings but there were no evidence of any demonstrable secondary deposits.

On 12—11—56, under general anaesthesia, radical mastectomy was performed and the raw area left behind after closure of the skin flaps was covered by Thiersch graft.

The patient had an uneventful convalescence and was discharged on 28—11—1956.

The histopathological examination of the tumour showed it to be papillary adenocarcinoma of the breast.

*Discussion :*

Carcinoma of the breast, though one of the commonest types of cancer found in women, is very rare in males and the incidence is only about one percent. The clinical features of the condition in the female are well known, but in the male, the disease develops under unfavourable conditions as regards the vascular supply of the part and the primary growth often remains small and apparently insignificant. Contrary to this usual picture, in the case under discussion, the growth attained very large dimensions so much so that after radical mastectomy there was not enough skin to cover the raw area and a primary skin grafting had to be resorted to.

According to the grading by the Radium commission, the case under review belongs to Grade II, since the primary growth as well as the axillary grands are freely mobile. In this classification, in grade I cases, the growth is limited to the substance of the breast. In grade II. the growth involves the breast and the axillary lymph nodes, but both are still mobile. In grade III, the growth has spread to extramammary tissues such as pectoral fascia, chest wall or the skin beyond the breast area. In grade IV, spread has occurred still beyond, to the opposite breast, the cervical glands, lungs, bone or other distant organs.

There are three principal methods of treatment available for these patients, either alone or in combination. These are surgical intervention, irradiation therapy and alteration of the hormonal balance. The most widely accepted

method is Radical mastectomy and this is indicated in all cases if the patient is judged to be fit to stand the operation and if the disease has not advanced to the stage of inoperability. Radical mastectomy aims at the removal of the following tissues : the whole breast an area of skin 4 to 6 inches in diameter according to the size of the growth which is in the centre the sternal part of the pectoralis major, the whole of the pectoralis minor muscle, the pectoral fascia and the whole of the fibro-fatty-lymphatic contents of the axilla.

In many cases, after the operation, closure of the wound is found to be difficult and this can sometimes be prevented by extensive undermining of the flaps. In cases where this is not possible or is insufficient, skin grafting should be done by Thiersch's method at the time of the operation. To ensure satisfactory healing after skin grafting, it is necessary that the flaps should be induced to adhere to the deeper tissues all round the grafted area and this is done by snicking the edge of the flap all round by radiating cuts ½ inch long and by suturing the edges of the flaps to the intercostal muscles by interrupted sutures before the grafts are applied. In the present case, this was the method adopted and the results were exceedingly good.

* * *

**Valvular Diseases of the Heart in Children**

Five cases of rheumatic manifestations of the heart were shown. They were.

*Case 1.* P, aged 10, complaining of slight dyspnoea and dyspepsia for the last six months without any cough or swelling anywhere. History of having had joint pains one year ago treated symptomatically.

On admission, the child was moderately nourished, heart sounds near normal, the first sound in the mitral area soft without any murmurs or adventitious sounds. The B. P. was 90/60 m.m. E. S. R. 8 m.m. in the first hour, and the urine normal. The child was slightly anaemic, with small unhealthy tonsils. Skiagram showed near-normal heart with no pulmonary conus evident. Lungs : near-normal, with a pulmonary flare on both sides.

*Case 2.* M. female 7 years, admitted with a complaint of palpitation and pain in the knee joints. Had been getting fever on and off for the last two years. Patient anaemic, ill-nourished, slight puffiness of the face present and slight oedema of both ankles present. No clubbing of fingers.

Findings : Diffuse apex beat, with a diastolic thrill at the mitral area. Apex beat low down and to the left. A mid and a late diastolic murmur with a soft systolic murmur was heard in the mitral area. Opening snap heard parasternally on the left side. Liver just palpable. Few moist sounds of both the lungs heard. B. P. 100/70 m.m. E. S. R. 1st hour 61 m.m. All other tests normal.

X-Ray findings : Cardio-thoracic ratio altered on both sides. Prominent pulmonary conus with pulmonary plethora. Curley's line present. Screening showed encroachment of the pulmonary window and enlargement of the left atrium., with impressions on the oesophagus.

*Case 3.* P, 7 years, female, complaining of fever and swelling of the knee joints, chest pain, oedema of ankles. Had rheumatic fever on and off for the last one year. Fairly well-nourished child, anaemic, no cyanosis or clubbing of the fingers apex beat in the left sixth intercostal space, outside mid-clavicular line, a systolic as well as a mid-diastolic murmur in the mitral area, loud P 2, few moist sounds in both lungs, liver palpable two fingers breadth and tender. Jugular pressure 2·5 c.m. above, J.V.P. positive, B. P. 100/50 m.m. R. B. C. 1·9 mill / c. m.m. E. S. R, 1st hour 105 m.m. Urine ; trace of albumin.

X-Ray : Cardiac shadow enlarged on the both sides. Pulmonary oedema present. Pulmonary conus prominent. Right auricle fringe seen on the left border of the heart.

Screening confirmed left auricular and right ventricular enlargement.

*Case 4* : S, aged 9, admitted with distension of abdomen, dyspnoea, oedema of both feet for the last four months. Had fever on and off with joint pains for the last two years. Patient is anaemic, slight cyanosis present, clubbing of fingers present, tonsils slightly enlarged.

Diffuse pulsations over the praecordium were seen. Apex beat in the sixth space running 1 inch outside the midclavicular line. A systolic murmur and a mid-diastolic murmur heard over the mitral area without any opening snap. A systolic murmur conducted up to the neck in the aortic area. Liver palpable and tender. Neck veins prominent, J.V. P. positive. B.P. 90/65 m.m.

Skiagram : Markedly enlarged heart, with the left border straightened out, pulmonary conus seen, right side of heart markedly enlarged with a shadow of the enlarged left atrium seen through the cardiac shadow.

*Case 5* : L, aged 9 years, admitted with pain over the praecordium, cough, dyspnoea of six months duration. History of rheumatic fever on and off during the last four years. Patient thin, ill-nourished, anaemic, but intelligent. On examination, there was forward thrust of the chest wall with a slight lateral push. Pulsation in the epigstrium present. Apex beat in the sixth intercostal apace, one inch outside the midclavicular line, variable in character. Right ventricular tap in the epigastrium. Signs of pulmonary oedema present. J. V. P. increased. Liver one finger below costal margin and tender.

Diastolic thrill was present in the mitral area. Opening snap heard. A diastolic murmur and a gross grade (iii) systolic murmur was present over the mitral area. A rough systolic murmur over the pulmonary area, with the second sound accentuated. Other areas normal. B. P. 85/60 m. m. E. S. R. normal. All other findings normal.

X-Ray showed markedly enlarged heart both to the right and the left. Prominent pulmonary conus. Shadow of left atrium seen. Right sided enlargement of the heart. Slight hypoplasia of the aorta. Relative pulmonary is chaemia.

The diagnosis of these cases were made as below :

No. 1 : Commencing rheumatic carditis.

No. 2 : Prominent mitral stenosis with a small regurgitation.

No. 3 : Mitral stenosis with moderate regurgitation.

No. 4 : Marked mitral stenosis with enlargement of the left atrium with a concomitant aortic lesion, stenotic in character.

No. 5 : Mitral stenosis, pure with probable pulmonary stenosis as evidenced by relative ischaemia of the lung fields.

*Discussion :*

These cases were shown to bring out (1) the high incidence of rheumatic diseases in India, (2) the seriousness of the sequelae (3) the poly-valvular lesions it could produce and (4) in a small way to show the gradations of the lesions.

Rheumatic fever has got four phases : phase (1) being infections of the upper respiratory tract ; Phase (2) a period of latency with vague limb pains, erythema nodosum and a raised E. S. R ; Phase

(3) a period of clinical rheumatic fever and Phase (4) a period of rheumatic inactivity or recrudescence and finally a period of sequelae, mostly on the heart. This disease is preventable in Phase (1) and Phase (2), controllable in Phase (3) it adequately treated ; and later only symptomatic treatment could be done without any further improvement.

In the symptomatology as far as the heart is concerned, in phase (3) there is a softening of the first sound with a prolongation of the P. R. interval in the E. C. G. and no radiographic evidence. Later when symptoms of mitral stenosis set in, the typical electro-cardiographic changes of P. mitrale notched P. waves. right-sided hypertrophy and X-Ray findings like enlargement of the pulmonary conus, enlargement of the left atrium are seen. If regurgitation is present, the resultant giant atrium may rotate the heart producing a forward thrust of the chest with a slight lateral thrust. This particular thing has been brought out in Case 5.

*Treatment:* Treatment of rheumatic fever should be undertaken early with all the methods at our disposal like salicylates, aspirin and cortisone if necessary. Penicillin has a place if there is any residual infection. Surgery is indicated after complications have set in the heart for pure mitral stenosis aortic stenosis or pulmonary stenosis. If they are accompanied by gross regurgitations, surgery would not be of much use. Surgery should be undertaken during a quiescent period when there is no evidence of rheumatic activity. It is not possible to discuss this further here.

*Prophylaxis:* In children in phase (1) and Phase (2) and also in Phase (4) in rheumatic fever prophylaxis should be given during the winter months with penicillin or sulpha drugs as a routine for all mild infections.

Children already affected by valvular disease of the heart who are well compensated otherwise should be protected as formerly, but also should be guarded against onset of bacterial endocarditis to which these valves are highly prone to.

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## Bilateral Transplantation of the Ureters.

The indication for this operation in the case of a young female aged 20 years was an intractable vesico-vaginal fistula following obstetrical mis management. The object in presenting this case was to emphasize the fact that nowadays transplantation of ureters whatever the indication may be can be done on both the sides in one stage and at one sitting. This is now possible because of the recent modifications of safer technique of transplantation of the ureters into the bowel, a clear appreciation of the physiological considerations following this operation, preparedness for possible complications and their management and the beneficial effects in the control of infection by broad spectrum antibiotics.

The common indications for ureterocolic anastomosis are (1) injury to the ureter so high up that implantation into the bladder is not possible, (2) ureterovaginal fistula, (3) as a preliminary to total cystectomy in tuberculosis and cancer of the bladder, (4) ectopia vesicae and (5) intractable vesico-vaginal fistula.

Coffey, Grey Turner and Wilfred Shaw have all contributed to the safer surgical techniques in the transplantations of the ureters and each claims his own technique as the best in the light of the results each has achieved. In the case presented, the best principles advocated by each one of the above surgeons were adopted.

The complications that are to be guarded against after this operation are anuria, paralytic ileus, peritonitis, burst abdomen urinary fistula, ascending infections and

achloraemic acidosis. In the case under review the following measures were taken to avoid these complications: Continuous drainage of the urine by keeping a Malecot's catheter in the rectum for four days post-operatively, later on strict instructions to empty the bowel every two hours ; sodium bicarbonate given during feeds three times a day and adequate antibiotic therapy pre-operatively and post-operatively. The patient had an uneventful convalescence and was discharged from the hospital.

* * * *

## Congenital Anomalies of the Gut in Children.

The two cases of imperforate anus presented were the only emergencies in infancy met with in this hospital during the past three months. The first was a straightforward case of imperforate anus. The child was seen two days after birth and the failure of development of the rectum was demonstrated radiologically. A transverse colostomy was done and the child went through an uneventful post-operative period.

The second case came twenty-four hours after birth and stimulated much interest because of the unusual congenital anomalies. This child also had a dimple at the site of the anus and radiological evidence was similar to the first case. An arrest in the development of the rectum was thought of and a transverse colostomy was decided upon. During the operation, surprisingly enough, the caecum and appendix were found to protrude through the wound and therefore an arrest in the third stage of rotation of the gut was appreciated. In addition, a peritoneal band which was passing across was ligated and excised. The caecum and ascending colon were followed up to what appeared to be a loop of transverse colon and a colostomy was done. Unfortunately, the child died after about 48 hours due to intestinal obstruction and as the mother gave permission to conduct a post mortem on this case, this was done. In addition to the imperforate anus and arrest in the third stage of rotation of the gut, a reverse rotation of the distal portion of the gut was also noticed. The colostomy tube was draining the distal portion of the gut and had caused a kink of the gut proximal to the colostomy wound. It was further noticed that the termination of the rectum was very close to the anal dimple.

This triple congenital anomaly with imperforate anus, arrest in the third stage of rotation of gut and reverse rotation of the distal portion of the gut has not been reported in the literature so far. From this case, we learn that the radiological coin sign is not an absolute and reliable one. It should be emphasized that transverse colostomy as a routine should be done in any high imperforate anus.

Dr. M. S. Ramamurthy who presented these cases spoke in detail about the embryological aspects of the development of the rectum and anal canal and the process of the rotation of the gut, illustrating the talk with very useful and impressive slides. While discussing the second case of imperforate anus, he projected on the screen the colour photographs taken during the post-mortem on this case and these were very helpful in demonstrating the unusual congenital anomalies discussed above.